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SCIENTIFIC INFORMATION REPORT

Electronics and Engineering

(28)

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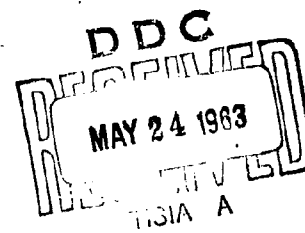
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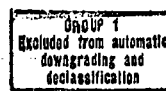
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C-O-N-F-I-D-E-N-T-I-A-L

SCIENTIFIC INFORMATION REPORT

Electronics and Engineering (28)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in seven series. Of these, five Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, Physics and Mathematics, and Organization and Administration of Soviet Science, are issued monthly. The sixth series, Chinese Science, is issued twice monthly, and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

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I. ELECTRONICS

Circuit Theory

1. Method of Improving the Characteristics of Self-Oscillators

"Synchronous Frequency Division and Multiplication in a Two-Circuit Self-Oscillator," by G. D. Shemanayev; Moscow, Radiotekhnika i Elektronika, Vol 8, No 1, Jan 63, pp 32-41

The article examines the phase relationships in two-circuit self-oscillators synchronized by a small external force with a rational fractional ratio between the acting and synchronizing frequencies. It is found that the characteristics of synchronous frequency dividers and multipliers may be improved if an auxiliary circuit is weakly coupled to the basic circuit but is not a part of the feedback circuit. With any multiple of frequencies, the synchronization band may be widened and the phase shift in the band decreased. For frequency division ($q=1$; $r > 1$), the gain in the band is of the same order as in a circuit with locking on the fundamental frequency. For multiplication ($q > 1$), the band may be increased several orders. Maximum gain is achieved by making the partial frequencies of the circuits identical and the coupling between the circuits equal to the critical frequency.

2. Improved Method of Investigating Secondary Electron Emission

"A Method of Investigating the Energy Distribution of Secondary Electrons During the Electron Bombardment of Metals," by V. A. Arifov and A. Kh. Kasymov; Moscow, Radiotekhnika i Elektronika, Vol 8, No 1, Jan 63, pp 138-144

An inertialess oscillographic method was developed for the simultaneous investigation of the integral and differential energy distributions of secondary electrons derived from Ta and Mo targets. The procedure involves the use of spherical and cylindrical condensers, in conjunction with a method of double modulation, and provides a high resolution, a large aperture ratio for the condensers, and rapid recording of the results.

The instrument consists of an electron source, collector, analyzer, and electron multiplier. A sphere with a diameter of 80 mm serves as the collector and is enclosed in a protective cylinder. A screen prevents the escape of tertiary electrons from the collector. A cylindrical

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condenser with an aperture of 127° and an equilibrium trajectory of 50 mm serves as the analyzer. Resolution of the analyzer is less than 2%. The integral and differential patterns of energy distribution and the total value of secondary electron current are fixed simultaneously on the screens of two oscillographs. Curves obtained by this method provide the possibility of detecting the existence of the two known groups of maxima in the energy spectrum of secondary electrons: (a) the peaks of characteristic losses caused by primary electrons imparting a certain energy to the electrons of the metal; and (b) the maximum in the low-energy spectrum caused by a certain portion of the primary electron energy.

This report was presented at the Tenth Conference on Cathode Electronics, Tashkent, November 1961.

3. Characteristics of Through Amplifiers With Negative Conductivity

"Operating Conditions of Through Amplifiers With Negative Conductivity for Microwave and Optical Ranges," by I. V. Lebedev and V. V. Lebedeva; Moscow, Radiotekhnika i Elektronika, Vol 8, No 2, Feb 63, pp 221-230

The authors examine the amplification factor, operating frequency range, and efficiency of regenerative through amplifiers of the resonator type (in contrast to reflex amplifiers), having an active medium to provide negative absorption. The features of symmetrical and "unidirectional" amplifiers are pointed out. A graphical analysis is made of the operating conditions and possible parameters of the amplifiers which may be used in the development of quantum and electronic amplifiers for the microwave and optical wave range.

It is concluded that an amplifier with symmetrical coupling elements provides the greatest amplification factor for a given frequency range or a maximum range for a given amplification factor. It is also possible to create unidirectional through amplifiers having maximum efficiency. To obtain a frequency range on the order of 1 - 2% of the average frequency with an amplification factor of 20 - 30 db, it is necessary to use electron flux or other active media for which the equivalent scalar conductance exceeds the equivalent conductance of the resonator system by 100 or more times. The use of resonators with a low characteristic admittance facilitates expansion of the frequency band.

4. Multichannel Frequency-Division Recording of Infrasonic Oscillations on Tape

"On the Question of a Multichannel Magnetic Recording of Infrasonic Oscillations With Frequency-Division of Channels," by V. V. Lysenko, Nauchnyye Zapiski, Odesskiy Politekhnikeskiiy Institut (Scientific Reports, The Odessa Polytechnic Institute), No 42, 1962, pp 16-19 (from Referativnyy Zhurnal -- Radiotekhnika i Elektrosvyaz', No 1, Jan 63, 1 B 452)

A brief description is given of a device for multichannel recording of infrasonic oscillations in which each oscillation amplitude-modulates a harmonic of the frequency 2,000 cycles per second. The sum of the oscillations is recorded by an ordinary tape recorder. To remove the effect of a slow parasitic AM resulting from the nonuniformity of the tape and of the contact it makes with all the channels, an automatic gain control is used which operates at the level of reproduction of the main (unmodulated) frequency of 2,000 cycles per second. To dampen interferences during pauses, carrier suppression is used during recording with postequalization detection.

Communications

5. Future Development of Wire Broadcasting in USSR

"Technical Base for Wire Broadcasting and Radio Servicing," by I. A. Shamshin; Moscow, Vestnik Svyazi, No 2, Feb 63, pp 4-6

At present there are several tens of thousands of radio points and installations in various cities and villages of the Soviet Union. The extent of wire broadcasting exceeds one million kilometers and services 35 million radio outlets. A large number of workers and engineers are engaged in servicing wire broadcasting systems.

Notwithstanding the fact that radio broadcasting and television broadcasting are rapidly developing in the USSR and the production of radio receivers and television receivers has considerably increased, wire broadcasting, due to its simplicity and relatively low cost, has not lost its significance and continues to grow. Very conservative estimates indicate that within the next 7-10 years the number of radio outlets for wire broadcasting will increase to 45 million. The wire broadcasting network and the capacity of broadcasting stations should increase accordingly.

It is reported that unfortunately in many cities identical programs are being transmitted over both radio broadcasting and wire broadcasting systems.

6. Use of Optimizer in Automatic Fine-Tuning Control of Transmitter

"Transmitter Automatic Fine-Tuning System With Automatic Optimizer," by K. B. Norkin, Moscow (Academy of Sciences USSR), Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 144-153 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-7-145 Zh)

The system, already designed and tested, provides a simultaneous fine-tuning of the output stage in resonance according to a minimum cathode current and a regulation of the antenna coupling according to the maintenance of this current at a specific level. For a preparatory coarse tuning, the system has an adjustable exciter unit and a "coarse" fine-tuning circuit in resonance. The coarse tuning time is 10-20 seconds, the holding of the minimum cathode current is accurate to within 0.5 percent. After coarse tuning, because of the noise, the system hunts about the extremum point with a period of 10-25 seconds. For a fine-tuning of the circuit in resonance, a single-channel, noise-stable, automatic, proportional-action type optimizer is used which, in successive steps, selects the extremal value of the control parameter. The antenna coupling control is provided by a very simple three-position controller with a zone of insensitivity. A theoretical analysis is made of the choice of parameters of the optimizer, with the influence of interferences on the operation of the optimizer integrator taken into account. A strong 50-cycle background noise does not affect the operational stability of the system.

7. City Telephone Systems in USSR Require Improvement

"To Speed Up the Development of and To Improve City Telephone Systems," by A. G. Serikov; Moscow, Vestnik Svyazi, No 2, Feb 63, p 10

The step-by-step automatic telephone stations (ATS-47, ATS-54) which are presently manufactured in the USSR, are far inferior to more progressive cross-bar telephone systems widely used in many countries abroad. The cross-bar telephone system utilizes instead of sliding contacts, contacts which are characterized by a lower level of noises. Operating expenses of cross-bar telephone systems are also considerably lower than those of the step-by-step systems.

The existing step-by-step automatic telephone systems in USSR require up to 9 seconds to make a call.

Nowwithstanding the obvious advantages of cross-bar telephone systems, the Soviet industry still manufactures only house type cross-bar telephone systems with a capacity of only 100 telephones.

8. Intermodulation Distortion in Single-Band and Two-Band Signal Reception

"Intermodulation Distortion in the Reception of Single-Band Signals," by I. V. Rozova, V. N. Shalygina, Trudy Tsentral'nogo Nauchnoissledovatel'skogo Instituta Morskogo Flota (Proceedings of the Central Scientific-Research Institute of the Maritime Fleet), No 39, 1961, pp 113-121 (From Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-7-164 a)

In a study of the nature of intermodulation distortion, expressions for the coefficient of intermodulation distortion during the reception of two-band AM and single-band signals in the presence of AM-interference were derived and compared. It was found that, in the case of identical interferences, the intermodulation distortions of the single-band signal are considerably less than the distortions of the two-band signals, but reception of the single-band signal is accompanied by combined interferences, the magnitude of which is as great as the intermodulation distortion of the two-band signal.

Components

9. Magnetic Recording Head With Built-in Amplifier

"Recording Head With Magnetic Amplifiers," by O. V. Poritskiy, Sbornik Nauchnykh Trudov, Institut Avtomatiki Gosplana USSR (Collection of Scientific Works, The Institute of Automation, State Planning Committee Ukrainian SSR), No 2, 1961, pp 88-96 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-7-220 Shch)

A magnetically modulated high-frequency recording head is discussed, which has a sensitivity in units of one volt. The head is a miniature magnetic amplifier controlled by an externally recorded magnetic signal and has positive feedback and a ferrite saturation core. To provide the possibility of reproducing the extremely long wave lengths of a recording, the operating gaps of the recording (main) heads are skewed at an angle of 30-60 degrees to the direction of the motion of the magnetic tape. Data and characteristics are given for the head.

10. Application of Cold Cathode Gas Discharge Tubes

"Great Future for Marvelous Tubes," by L. Korablev, Physics Institute, Academy of Sciences USSR, Moscow, Pravda, 18 Feb 63, p 2

Cold cathode tubes, in contrast to vacuum tubes, are filled with an inert gas in which complex physical processes take place. However, these tubes are very simple in construction and are cheap to produce. Cold cathode tubes have numerous applications and one such tube can function in place of several vacuum tubes. A television receiver, incorporating cold cathode tubes has been built at the Physics Institute.

Insufficient information on the operating characteristics of these tubes hinders their wide application, although the Academy of Sciences USSR has developed about 400 circuits utilizing the tubes.

Production of gas discharge cold cathode tubes is poorly organized in the USSR and the assortment of such tubes is very limited.

Many manufacturing enterprises are resenting the use of cold cathode tubes because they find that the use of more expensive vacuum tubes brings them higher profit. Such resentment toward inexpensive components is illustrated by the following fact: The first computer utilizing cold cathode tubes, built at the Moscow Plant "Fizpribor," was unlawfully scrapped soon after its return from an international exposition.

Not a single plant wants to engage in manufacturing the two-electrode tubes "MM-6", the cost of which is only about 5 kopecks apiece.

The author believes that cold-cathode tubes have decided advantages over both vacuum tubes and semiconductor devices.

11. Pulsed Remagnetization of Ribbon Cores

"The Dynamics of the Processes Involved in Pulsed Remagnetization of Ribbon Cores," by V. G. Mikhalev, Trudy Moskovskogo Fizikotekhnicheskogo Instituta (Proceedings of the Moscow Physicotechnical Institute), No 8, 1962, pp 38-49 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-7-275v)

In a study of the properties of ribbon-type magnetic cores with square hysteresis loop, an analysis is made of the influence of magnetic lag and eddy currents on the rate of remagnetization, and the theoretical and experimental data are compared. The dynamic properties of ribbon cores made from 79NM material are compared with the properties of VT-5 ferrite cores for the case of ribbon thicknesses of 3 and 20 microns. A formula is derived for computing the remagnetization time (with square current pulses) of cores made of metallic ribbon of different thicknesses.

Information Theory12. Energy Spectra of Group Signals in Multichannel Systems

"Energy Spectra of Group Signals in Multichannel Pulse Systems," by B. R. Levin and Ya. A. Fomin; Moscow, Elektrosvyaz', No 2, Feb 63, pp 3-10

The theory of the energy spectra of random pulse processes is extended to the case of a sequence of group pulses, where the pulses in the group may be of various shape. Formulas are derived for group energy spectra in multichannel systems with pulse-amplitude, pulse-time, and pulse-duration modulation, with consideration for both useful and parasitic pulse modulation.

13. Minimum Pulse Duration in Superhigh Frequency Devices

"Method of Determining the Shortest Possible Duration of Radio Pulses in Superhigh Frequency Devices," by A. B. Dogadkin; Moscow, Elektrosvyaz', No 2, Feb 63, pp 11-15

A method is proposed for determining the limiting (shortest possible) duration of radio pulses generated by any type of superhigh frequency device. The method is based on an analysis of frequency characteristics. Only the magnitude of the electronic tuning range or the width of the pass-band is used in the numerical calculations if pulse modulation of the signal is used in the amplifier. The method is verified by an experimental investigation of the excitation of short pulses by reflex klystrons. The author also examines the carrier frequency for pulses of limiting duration in the case when the relationship of the phase of the spectral components to the frequency is described by a quadratic function.

14. Optimum Codes for Information Channels

"Asymptotic Optimum of Systematic and Group Codes for Certain Channels," by R. L. Dobrushin; Moscow, Teoriya Veroyatnostey i yeye Primeneniya, Vol 8, No 1, 1963, pp 52-65

A memoryless channel with a finite alphabet E_1, \dots, E_m is considered, where $M = s^k$, s is a prime number and k is an integer. It is assumed that the symbols E_1, \dots, E_m are the elements of a commutative group and, moreover, that the transmission probability from $E_i + E_k$ to $E_j + E_k$ for all subscripts i, j , and k . It is proven that in some sense the minimum probability of errors for all of the codes is asymptotically equal to the minimum probability of error for all of the group codes, provided the transmission rate is large enough. Some other similar results are obtained in the paper.

Instruments and Equipment15. New Automatic Rectifiers

"New Series of Automatic Rectifiers"; Moscow, Vestnik Svyazi, No 2, Feb 63, inside front cover

The Central Design Bureau of the Ministry of Communications USSR has developed a new series of automatic rectifiers with capacities of 2, 4, 9, and 16 kilowatts. These rectifiers are designated as follows: The 2-kilowatt unit -- VU-36/60, VU-93/22, VU-170-11, and VU-320/6; the 4-kilowatt units -- VU-36/120, VU-66/70, VU-140/35, and VU-320/11; the 9-kilowatt units -- VU-36/250, VU-66/140, VU-140/66, and VU-320/27; and the 16-kilowatt units -- VU-66/260 and VU-265/60. Numerator of the fraction indicates the maximum value of rectified voltage at the out put, and the denominator of the fraction indicates the maximum value of rectified current in amperes. The new rectifiers are considerably better than those previously produced in the USSR or abroad. The weight of the new equipment is low and efficiency is rather high. A new type of saturable reactors, made of cold rolled steel, is used in these rectifiers.

16. Powerful Frequency Converters

"Our Dreams, Our Deeds," by M. Spitsin, Director of the High-Frequency Current Institute imeni V. P. Vologdin; Moscow, Vechernyaya Moskva, 11 Feb 63, p 3

The High-Frequency Current Institute imeni V. P. Vologdin has designed, under the direction of Candidate of Technical Sciences A. Slukhotskiy and laboratory chief A. Bamner, the first ionic frequency converter having a capacity of 1,500 kilowatts. This high-frequency converter will generate current at a frequency of 1,000 cycles per second for surface hardening of automobile shafts. The All-Union Electrical Engineering Institute imeni V. I. Lenin has built a new test stand for ionic frequency converters of still greater capacity.

17. Electrohydraulic Impact Helps Cleaning Castings

"Lightning Is Doing the Work..," by B. Zubkov; Moscow, Komsomol'skaya Pravda, 26 Jan 63, p 4

The electrohydraulic effect, discovered several years ago, is produced by placing two electrodes in water and passing a high-voltage discharge between them. Each such underwater discharge is accompanied by a hydraulic shock which raises the pressure of the water to several thousand atmospheres in the vicinity of the electrodes. Due to the short duration of such an impact, its effect is limited to the proximity of electrodes; therefore, rocks can be crushed in a thin-wall vessel without damage to the container.

An experiment in cleaning sand from steel castings with the aid of the electrohydraulic effect was conducted at the Leningrad Machine Tool Building Plant imeni Ya. M. Sverdlov. It takes from 5 to 7 minutes of electrohydraulic treatment to turn the sand-covered surface of a casting into a bright surface free of any blemish.

During the All-Union Conference of Foundrymen in March 1962, in Leningrad, the new process was demonstrated before 500 experts, who were astounded by the effectiveness of the process.

The electrohydraulic method of casting cleaning requires only 10% of the electric power needed for other methods of cleaning. This method lends itself nicely to complete automation.

18. Device for Measuring Admissible Inverse Volts of Diodes

"A Device for the Automatic Determination of the Admissible Inverse Voltage of Semiconductor Power Diodes When the Voltage Increase Is Stepwise," by M. P. Vayvars, Trudy Instituta Elektroniki i Vychislitel'noy Tekhniki AN LatvSSR (Proceedings of the Institute of Electronics and Computer Engineering, Academy of Sciences Latvian SSR), Vol 2, 1962, pp 97-103, (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-4-61 f)

Admissible inverse volts are measured with two types of electronic elements, mathematic and logic; the mathematic elements compute directly the magnitudes of the criteria which determine the admissible inverse volts when there is a voltage increase at the diode, whereas the logic elements compare the computed values with values provided in accordance with technical conditions. In the device described here, the voltage at the diode increases stepwise, whereas the criteria are assumed to be ratios of finite increments of voltage and current the power liberated at the p-n junction during an inverse flow of current, and the maximum value of the inverse current. When one of the criteria is satisfied, the increase of voltage at the diode ceases; this voltage, when measured by appropriate sensing devices, likewise represents the admissible inverse volts of the diode.

The performance was tested on a model using type VK-50 silicon diodes; the device is recommended for use at plants which produce diodes and rectifiers.

[See also "Measuring and Recording" in part II.]

Materials19. Electrical Properties of Thin Cadmium Telluride Films

"Some Electrical Properties of Thin Films of Cadmium Telluride," by M. V. Kot and Yu. Ye. Maronchuk, Uchenyye Zapiski, Kishinevskiy Universitet (Scientific Reports, Kishinev University), Vol 49, 1961, pp 78-85 (from Referativnyy Zhurnal -- Elektronika i Yeye Primeneniye, No 1, Jan 63, 1 B 65)

A study was made of the most advantageous method of producing thin films of CdTe and of their electrical, optical, and photoelectrical properties. The films were produced by the Vekshinskiy method. It was established that thin films of the system Cd-Te contain one CdTe compound and that in such films only small excesses of the components are in solution; the dissolved Cd forms donors, and the Te, acceptors. A study was made of the tensile strengths of CdTe films restored from solid specimens. It was found that

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CdTe does not dissociate during evaporation from the solid phase. Films produced on a glass substrate at 20 deg C have nonreproducible properties because of the inconsistency of a stable structure. Films evaporated on substrates heated at 250 deg C or over have stable properties and always have p-type conductivity. The tensile strength of CdTe films increases as the thickness decreases from 0.5 to 0.2 micron. Sorbed air causes an increase of tensile strength. Silver-doped CdTe films have p-type conductivity, and those doped with indium have n-type. Ohmic contacts for the former are nickel electrodes; and for the latter, indium. CdTe films have the properties of the solid polycrystals and single crystals. Computed on the basis of the temperature dependence of the tensile strength, the forbidden zone is 1.45-1.50 electron volts wide.

20. Electrical Properties of Thin Films of Indium Antimonide

"The Electrical Properties of Thin Films of Indium Antimonide," by V. A. Kas'yan and M. V. Kot, Uchenyye Zapiski, Kishinevskiy Universitet (Scientific Reports, The Kishinev University), Vol 49, 1961, pp 69-77 (from Referativnyy Zhurnal -- Elektronika i Yeye Primeneniye, No 1, Jan 63, 1 B 33)

A description is given of a method of obtaining thin films of InSb, as well as the results of an investigation of their properties. The films were produced with an apparatus consisting of a glass tube 50 mm in diameter and 250 mm long, in which a nickel frame with a glass backing can be heated up to 500 deg C. Opposite the nickel frame is a prolongation terminated by a polished section and containing an evaporator in the form of a graphite crucible heated by a tungsten coil. About 250-500 milligrams of n-type monocrystalline InSb with a concentration of $6 \cdot 10^{13} \text{cm}^{-3}$ or p-type with a concentration of 10^{15}cm^{-3} is placed into the evaporator. Before evaporation the substrate is degassed at 400 deg C. The evaporation was done on both cold (20 deg C) and hot (200 and 300 deg C) substrates at a pressure of 10^{-5} mm Hg. Most frequently, the evaporation was done at a rate at which a film 1,000 angstroms thick would be produced within 3-5 minutes at a temperature of 1,000 deg C.

It was established that the best results were obtained with weighed samples containing 70 percent indium by weight and 30 percent antimony by weight, with a total weight of 500 milligrams. Under these conditions, the film thickness was 0.6 micron. Films evaporated onto cold substrates under these conditions required annealing at 300 deg C, which increased their stability and electron mobilities. It was found that O_2 -sorption noticeably changes the electrical characteristics of the stabilized films. It produces surface levels which act as electron traps.

The dependence of the electrical properties of InSb films on thickness was established, and an explanation was given of the dependence of the Hall constant on the intensity of the magnetic field for films equal to or less than 0.1 micron in thickness.

21. Firing Temperature and Dielectric Properties of Mixed BaTiO₃-BaFeO₃

"On the Influence of the Firing Temperature and the State of the Original Components on the Dielectric Properties of Mixtures of BaTiO₃ - BaFeO₃," by O. I. Prokopalo and Ye. G. Fesenko, Rostov-na-Donu (Rostov University), Segnetoelektriki, (Seignetto-electrics -- a collection of articles), 1961, pp 101-104 (from Referativnyy Zhurnal -- Elektrotehnika i Energetika, No 1, Jan 63, 1 B 59)

A study was made of the dependence of the properties of isomorphic mixtures of BaTiO₃ on the crystalline modification of the original components and temperature of the final firing. The BaTiO₃ specimens were obtained in cubic and tetragonal modifications, synthesized from Ba(OH)₂·8H₂O and TiO₂ at temperatures of 800 deg C and 1,300 deg C; the BaFeO₃ specimens were obtained in cubic, tetragonal, and hexagonal modifications. The BaTiO₃-BaFeO₃ system was studied as cubic-cubic, cubic-tetragonal, cubic-hexagonal, tetragonal-cubic, tetragonal-tetragonal, and tetragonal-hexagonal fired at 1,380 and 1,500 deg C, whereby the BaFeO₃ concentration never exceeded 10 mol percent. The temperature dependence of (permittivity) at 20-130 deg C and 5 · 10⁵ cycles per second was plotted, and the specimens were studied by X ray. It is shown that the properties of the specimens prepared from the tetragonal and cubic BaTiO₃ are quite different.

At a firing temperature of about 1,380 deg C and in specimens of the tetragonal-cubic, tetragonal-tetragonal, and tetragonal-hexagonal modifications with increased BaFeO₃ concentration, the ϵ value diminished, particularly at the Curie point temperature θ , whereby θ practically remained unchanged, dropping somewhat in specimens fired at 1,500 deg C. In specimens of the cubic-cubic, cubic-tetragonal, and cubic-hexagonal fired at 1,380 deg C, not only was a reduction of ϵ noticed, but also of θ ; and in specimens fired at 1,500 deg C, θ dropped noticeably with increase concentration of BaFeO₃. During a firing of the specimens, a reciprocal diffusion of Fe-ions into BaTiO₃ and of Ti-ions into BaFeO₃ occurred. It is possible, however, to limit inspection to the diffusion of Fe-ions to places occupied by Ti-ions. In this case, each BaFeO₃ crystal can be considered within an environment of BaTiO₃ crystals.

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At a temperature not exceeding 1,380 deg C, the Fe-ions migrate out of the BaTiO_3 into only those BaFeO_3 crystals which directly surround them, and this leads to the transformation of the BaTiO_3 into the hexagonal modification. Thus at about 1,380 deg C, the specimens contain, along with the pure BaTiO_3 in the perovskite modification, hexagonal BaFeO_3 and $\text{Ba}(\text{Ti}_{1-x}\text{Fe}_x)_3$. The authors explain this by the fact that, with increased BaFeO_3 concentration, θ does not change, but ϵ decreases increasingly with BaFeO_3 concentration in the specimens. When the firing temperature is approximately 1,500 deg C, the migrating Fe-ions cross the boundaries of the crystals, which leads to a uniform concentration of Fe-ions in the specimens.

At low BaFeO_3 concentrations, when the temperature is below the temperature of the transformation of the perovskite modification into the hexagonal, a third solution $\text{Ba}(\text{Ti}_{1-x}\text{Fe}_x)_3$ is formed with spontaneous deformations below those of the BaTiO_3 , which causes a reduction of θ . At high BaFeO_3 concentrations, the temperature of the transformation from the perovskite to the hexagonal modification is lowered, and two phases exist in the specimen: a perovskite with lowered spontaneous deformations and a hexagonal phase. It was found that the relationship of these two phases at a given temperature depends on the duration of firing. It is shown that thermodynamic stability and the degree of dispersivity of the original modifications play considerable roles in the processes examined.

22. Influence of Firing Temperatures on Piezoelectric Properties of Barium Titanate Ceramic

"The Influence of Heat Treatment on the Piezoelectric Properties of a Barium Titanate Seignettoceramic," by Ta. A. Shpolyanskiy, Rostov-na-Donu, Seignettoelektriki (Seignettoelectrics -- a collection of articles, 1961, pp 91-95, (from Referativnyy Zhurnal -- Elektrotehnika i Energetika, No 1, Jan 63, 1 B 57))

In a study of the influence of heat treatment regime on the piezoelectric properties of a ceramic barium titanate, the static piezoelectric coefficient was determined by the usual method of measuring the charge produced at the electrodes of the piezoelectric during the compression, or pressure release, of a specimen. An apparatus built for studying the temperature dependence of the piezoelectric coefficient provided measurements of the latter with an accuracy of plus-minus 6.5 percent. The specimens were polarized by slowly cooling from 0 to room temperature. The voltage of the polarizing field increased during the process of cooling from 6 kilovolts per centimeter (at 130 deg C) to 2 kilovolts per millimeter (at 40 deg C), during which time the current passing through the specimen did not exceed 0.5 milliamperes.

The specimens were prepared from TiO_2 and $BaCO_3$, the latter being obtained by passing CO_2 through an aqueous solution of $Ba(OH)_2$; body firing was done at 1,220-1,400 deg C and final firing at 1,330-1,420 deg C. The piezoelectric coefficient d_{33} was measured at room temperature (first measurement 10-15 minutes after polarization) one each day for about 3 months, which afforded a possibility of following changes (age-hardening). It was found that d_{33} is reduced when the temperature of the body firing is increased. Specimens in which the final firing was at 1,380 deg C (body firing remaining unchanged) had the highest steady-state values for the piezoelectric coefficient. The rather difficult-to-control technological processes (grinding, mixing, etc.) had an appreciable influence on the uniformity of the specimen properties. The $tg\delta$ (loss factor), values of the specimens studied were quite high (about 4 percent at one kilocycle); the most advantageous heat treatment regime was a body firing temperature of 1,280-1,350 deg C and a final firing of 1,380 deg C.

23. Effects of Substituting Impurity Ions for the Ti Ions in BaTiO₃

"A Study of the Influence of an Isomorphic Substitution of Titanium Ions by Chromium, Manganese, Cobalt, and Nickel Ions on the Phase Transformation in BaTiO₃," by Ye. G. Fesenko, O. P. Kramarov, V. D. Komarov, and Ya. A. Shpolyanskiy, Rostov-na-Donu (Rostov University), Segnetoelektriki (Seignettelectrics -- a collection of articles), 1961, pp 96-100 (from Referativnyy Zhurnal -- Elektrotehnika i Energetika, No 1, Jan 63, 1 B 58)

The BaTiO₃ specimens investigated were both pure and with impurities of Cr, Mn, Co, and Ni and were synthesized out of Ba CO₃ and TiO₂ with a one mol percent excess of TiO₂; annealing was at 1,280 deg C. Impurity specimens were prepared by mixing pulverized BaTiO₃ with additions of Cr₂O₃, MnO₂, CoCO₃, NiO, and Ni₂O₃ for 4 hours in a ball mill, followed by pressing and annealing for 30 minutes in a sinter furnace. It was found that the substitution in the BaTiO₃ of the Ti ions by ions of Cr, Mn, Co, and Ni reduces the sintering temperature and the temperature of the transformation from the perovskite modification to the hexagonal and causes an acceleration of recrystallization. From a comparison of the results of an X-ray study and a study of the temperature dependence of ϵ (Permittivity) from 20 to 140 deg C at 500 kilocycles with the piezoelectric coefficient of the specimens, it is concluded that, depending on the temperature of the final annealing (1,380 deg C or 1,430 deg C), the specimens with low concentrations of the impurity ions Ni and Co (and probably Cr and Mn) can have either a perovskite structure with high ϵ value or a hexagonal structure with low ϵ value. The phase and properties of the specimens after the second annealing were determined by the temperature of the final annealing, which indicates that the transformation from the perovskite to the hexagonal modification is reversible.

24. Single Crystals of PbZrO₃ Produced by Evaporation Method

"Single Crystals of Lead Metazirconate," by M. L. Sholokhovich, V. I. Varicheva, and O. P. Kramarov, Rostov-na-Donu, Segnetoelektriki, (Seignettelectrics -- a collection of articles), 1961, pp 31-36 (from Referativnyy Zhurnal -- Elektrotehnika i Energetika, No 1, Jan 63, 1 B 56)

For preparing single crystals of PbZrO₃ from melts of the mixtures PbO and ZrO₂ in KF, KCl, PbF₂, Pb₃, (PO₄)₂, NaCl, Na₂WO₄, and a technology is described which affords the possibility of obtaining single crystal

specimens down to 30 microns in size. Specimens of PbZrO_3 one to two millimeters in size were successfully obtained by the method of evaporating lead chloride from a melt of $\text{PbO-ZrO}_2\text{-PbCl}_2$; the temperature dependence of the value (permittivity) was determined for these specimens, and the temperature response of the hysteresis loop was studied.

25. Ferroelectric Properties of Ceramics and Single Crystals of Ba (Ti-Hf) O_3

"New Siegnettoelectrics With High Nonlinearity," by M. L. Kholokhov, A. L. Khodakov, T. N. Lezgintseva, and V. I. Varicheva; Rostov-na-Donu, Segnetoelektriki (Seignettoelectrics -- a collection of articles), 1961, pp 12-20 (from Referativnyy Zhurnal -- Elektrotehnika i Energetika, No 1, Jan 63, 1 B 54)

The study emphasized the ferroelectric properties of ceramics and single crystals of the solid solutions Ba(Ti-Hf)O_3 . The hafnium content varied up to 25 mol percent. The formed ceramic specimens were thrice annealed at 1,000, 1,450, and 1,500 deg C (for 20 hours at 1,000 deg C). After the first annealing, the specimens were crushed and reformed. The ceramic specimens containing over 5 or 6 percent hafnium became porous. The single crystals of the Ba(Ti-Hf)O_3 (solvents were melts of K_2F_2) had the shape of large triangular films grown together along one edge. The length of the edges of some of the sheets was as much as 2 1/2 centimeters, and the thickness varied from 80 to 500 microns. The sheets were light yellow in color and were transparent. As a rule, a number of single crystals in the shape of cubes were found in the surface layer of the cooled melt. X-ray analysis showed that the composition of the single crystals differed from the composition of the original room temperature to 150 deg C at $5 \cdot 10^5$ cycles per second showed that, with increased Hf concentration in the solid solution, the maximum ϵ (permittivity) was observed at the lowest temperature (linear dependence on Hf concentration) and that the highest ϵ was shown by a solution with 6 mol percent Hf. At room temperature, the $\text{tg}\delta$ (loss factor) of the single crystals was on the order of $(300-700) \cdot 10^{-4}$.

26. Properties of Lead Titanate and Strontium Titanate Single Crystals

"Monocrystals of the Solid Solutions of the Titanates of Strontium and Lead," by O. P. Kramarov, A. L. Khodakov, M. L. Sholokhov, and Ye. G. Fesenko, Rostov-na-Donu, Segnetoelektriki (Seignettoelectrics -- a collection of articles), 1961, pp 5-11 (from Referativnyy Zhurnal -- Elektrotehnika i Energetika, No 1, Jan 63, 1 B 51)

A study was made of monocrystals of the solid solutions $(\text{Pb,Sr})\text{TiO}_3$ grown by slow cooling (5-10 degrees per hour) in a platinum crucible from melts of mixtures of PbTiO_3 , SrTiO_3 , and KF. Specimens

containing 10, 25, 40, and 50 mol percent PbTiO_3 were grown in the temperature range 1,273-1,103 deg K (1,000-830 deg C), and those containing 60 and 75 percent PbTiO_3 , during a cooling of the melts from 1,373 deg K (1,100 deg C). It was found that the lattice parameter increases with an increased amount of isomorphically exchange Sr ions in place of the Pb ions in the SrTiO_3 mixture as a result of the difference in the ion radii. X-ray spectral analysis indicated that the composition of the obtained specimens practically coincided with the composition of the mixture. A study was made of the temperature dependence of ϵ (permittivity) and $\text{tg}\delta$, (loss factor) from minus 200 to 400 deg C at 10^6 cycles per second and at 50 cycles per second. The θ values of the monocrystals proved to be close to known values for the polycrystals. The $\text{tg}\delta$ value increases slightly with increased Pb concentration and at minimum amounts to $(40-70) \cdot 10^{-4}$.

To obtain the θ of compounds with high specific conductivity, a specially designed dilatometer was used with which specimens with dimensions with dimensions down to 1-2 millimeters could be tested for elongation. This method established the fact that the phase transformation of the PbTiO_3 occurs at 785 deg K (512 deg C). Hysteresis loops studied at 50 cycles per second at room temperature in fields of up to 12 kilovolts per centimeter did not attain saturation. It was found that the index of refraction changes abruptly within the limits 2.35 (for the SrTiO_3) to 2.70 (for the PbTiO_3).

27. Conductivity in Ceramics

"A Study of the Nature of Conductivity in Ceramic Materials," by M. V. Vaysman, Uchnyye Zapiski Stalingradskogo Gosudarstvennogo Pedagogicheskogo Instituta (Scientific Reports of the Stalingrad State Pedagogical Institute), No 11, 1959, pp 85-91 (from Referativnyy Zhurnal -- Radiotekhnika i Elektrosvyaz, No 1, Jan 63, 1 B 508)

It was established that the examined ceramic materials have a purely ionic conductivity in the temperature range 350-550 deg C, as is expected from the presence of impurity ions of alkaline materials in the vitreous bed and from the Al^{+++} ion at the relatively high temperature. At low temperatures, the majority carriers are the Na and Mg ions, with the Mg ions undergoing the greater percentage of migrations. The migrations for aluminum are few with respect to absolute quantity, but they increase linearly with temperature. Fe-ions begin to participate in conductivity only above 450 deg C. The number of migrations is greater for trivalent aluminum than for bivalent calcium. A determination was made of the number of migrations as a function of temperature for the ions Na^+ , Mg^{++} , Al^{+++} , Fe^{++} , and Fe^{+++} in the indicated temperature range.

28. Magnetomechanical Hysteresis of Ferrite E-1 (Ni-Co-Mn)

"Hysteresis of the Magnetomechanical Parameters of the Magnetostrictive Ferrite E-1," by Z. Kachkovski, Institute of the Fundamental Problems of Engineering, Polish Academy of Sciences, Warsaw; Moscow, Akusticheskiy Zhurnal, Vol 9, No 1, Jan/Mar 63, pp 37-46

This paper reports a study conducted by the institute on the Ni-Co-Mn ferrite E-1 and gives the dependences of the reciprocal dynamic parameters (magnetomechanical, mechanical, and magnetic) on the intensity of a constant magnetic field. The following maximum values were obtained for room temperature (20 deg C):

coefficient of magnetomechanical coupling, $k_{\max} = 0.32$;

mechanical stress/ permittivity ratio, $\mu\sigma_{\max} = 57.0$ gauss/oersted;

permittivity/deformation ratio, $\mu\epsilon_{\max} = 57.0$ gauss/oersted;

magnetostrictive constants of material: $d_{\max} = 5.8 \cdot 10^{-6}$ gauss·cm²/dyne

$h_{\max} = 2.3 \cdot 10^{-4}$ dynes/cm²

gauss

$g_{\max} = 1.3 \cdot 10^{-8}$ dynes/cm²

gauss

$e_{\max} = -8.8 \cdot 10^6$ gauss.

Navigation Aids29. Errors in Combined Air-Ground Navigational Systems

"On the Theory of Combined Navigational Systems," by A. S. Semenov, Trudy Moskovskogo Aviatsionnogo Instituta (Proceedings of the Moscow Aviation Institute), No 147, 1962, pp 35-44 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-203 u)

A study of the errors of a complex, two-component navigation system consisting of an airborne aerodynamic-flight-path computer and ground (radio or radar) system, with emphasis on the operation of the functional circuit in a continuous-correction regime and during flight in a zone of radio shadow, shows the necessity of converting the navigational parameters into a unit system of coordinates by means of a special trigonometric device. The circuit should also be understood to include stabilizing elements for damping the fluctuating components of the errors of the transducers.

Moletronics, Quantum Electronics, Superconductivity30. Molecular Generators With Series-Connected Resonators

"Molecular Generator With Two Series-Connected Resonators,"
by E. M. Belenov and A. N. Orayevskiy; Moscow, Radiotekhnika
i Elektronika, Vol 8, No 1, Jan 63, pp 158-161

It is shown that a molecular generator with two series-connected resonators is capable of supporting an oscillating regime for which the effective Q-factor of the line is determined by the transit time between the resonators, thus making it possible to more accurately adjust the frequency of the generator. At the same time, the effect of the traveling wave on the frequency of the generator is substantially reduced. The limits of mismatching between the natural frequencies of the resonators within which the above conditions are possible are computed.

31. Two-Beam Molecular Generators With High Frequency Stability

"Generator With Two Opposing Beams of $N^{15}H_3$ Ammonia Molecules," by V. V. Nikitin; Moscow, Radiotekhnika i Elektronika, Vol 8, No 1, Jan 63, pp 153-157

The author investigates the relationship of the frequency of a molecular generator with two opposing beams to different parameters (pressure in the molecular beam source, voltage of the sorting system, resonator frequency) for the line $J = 3, K = 3$ of an $N^{15}H_3$ molecule. This frequency relationship is also studied for various designs of the molecular generator (different resonator lengths and sorting systems). The experiments showed that such generators, of symmetrical design with identical sorting systems and tuned by a magnetic modulation method, may serve as a frequency (time) standard with an accuracy greater than 10^{-10} .

The author thanks N. G. Basov for his assistance in the work.

32. Molecular Generator With Disc Resonator

"Ammonia Molecular Generator Using a Disc Resonator," by
A. I. Barchukov, A. M. Prokhorov, and V. V. Savranskiy;
Moscow, Radiotekhnika i Elektronika, Vol 8, No 3, Mar 63,
pp 438-439

An ammonia molecular generator with a disc resonator in described. The generator operated at a wave length $\lambda = 1.25$ with a distance between discs $L = \lambda$ and $Q = 7,000-8,000$. Parallelism of the discs was maintained with the aid of three small quartz posts, while slight adjustment in the vicinity of the generating line was provided by light compression of the discs with a micrometric screw. The sorting system was in the shape of a ring capacitor. The generator had a total of 18 beams located equidistant around the circumference, concentric to the resonator and mounted in groups of three beams. The geometric size of the resonator was approximately 400 cm^3 , while the operating area was 200 cm^3 . Amplification was observed when operating with one beam and a voltage between the rings equal to 12-15 kv. A generating line appeared with two beams of ammonia molecules and an increase in voltage to 35 kv. Connection of the third beam increased the generating line. It is planned to investigate the operation of the generator with many beams and to study the possibility of tuning the generator by applying a constant voltage to the discs.

33. Frequency Reproducibility in Molecular Generators

"Frequency Reproducibility in Molecular Generators of Identical Design," by A. Ya. Leykin and Ye. Z. Orlov; Moscow, Izmeritel'naya Tekhnika, No 2, Feb 63, pp 46-48

In this investigation, four identical molecular generators were used which were adjusted for a voltage of 35,000 volts at the quadrupole capacitors.

The effect of change in ammonia pressure and voltage at the quadrupole capacitors on the oscillator frequency was examined. To study the effect of voltage variation on the generated frequency, the voltage at the quadrupole capacitor of one oscillator was varied in the range from 22 to 37 kilovolts, while the voltage on the other was maintained at 35 kilovolts. Measurements have indicated that variations in voltage up to 15,000 volts change the frequency only by 70 cps, which corresponds approximately to 5 cycles per second for every 1,000 volts.

The results of this investigation show that identical molecular generators have frequency reproducibility with rms error of 1×10^{-9} .

34. Multiresonator Quantum Amplifiers

"Multiresonator Quantum Amplifiers," by N. V. Karlov and A. M. Prokhorov, Physics Institute imeni P. N. Lebedev; Moscow, Radiotekhnika i Elektronika, Vol 8, No 3, Mar 63, pp 453-456

"Multiresonator quantum amplifiers of the reflex type are considered for the case of an arbitrary relationship between the passband of the resonator and the width of the resonance absorption line of the substance used. Relationships are derived which link the amplification factor and the width of the passband of the amplifier for some partial cases.

35. Current Stability in Superconductors

"Current Switching and Stability in a Superconducting Memory Device," by S. Ya. Berkovich; Moscow, Radiotekhnika i Elektronika, Vol 8, No 2, Feb 63, pp 257-261

The author examines the question of current stability in a multi-connection superconductor as it relates to thermal effects. The results obtained explain certain peculiarities of the operation of superconduct-

the memory elements under ...
 ... is suitable for practical use.

The author thanks R. A. Chentsov and A. A. Korsunskiy for their assistance.

Telemetry

36. Cyclic Converter for a Series of Pulses

"Cyclic Functional Converters of a Number of Pulses," by V. B. Smolov, Izvestiya Leningradskogo Elektrotekhnicheskogo Instituta, No 46, 1961, pp 42-49 (from Referativnyy Zhurnal -- Avtomatika, Telemekhanika i Vychislitel'naya Tekhnika, No 1, Jan 63, 1A314)

The method of designing and the principles of operation are discussed for the case of cyclic functional converters of a number of pulses which are capable of reproducing a majority of functions of the form $z = F(x)$, in which the argument x and the function z are proportional to the corresponding number of pulses. The pulses are generally registered during the cycle by binary input and output counters. The discussion considers methods of piecemeal-stepwise and piecemeal-linear approximation of the direct functions during a cyclic pulse of given argument. A block diagram is given for a cyclic functional converter capable of performing the discussed variations.

37. Noise Stability in Telemetric Timing

"Noise Stability of Timing Systems in Telemetry With Memory and Integration," by V. M. Pomazan; Moscow, Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control--a collection of articles), 1962, pp 386-391 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-120 d)

A study was made of the method of receiving signals (storage plus integration) in telemetering systems with pulse-height/amplitude modulation and pulse-width/amplitude modulation, when the communications channel contains both weak and strong fluctuating noise. In the majority of actual receivers, the error is a random value with a distribution close to normal. Here, it is conveniently characterized by mean and mean square values. The experimental results obtained were in very good agreement with theory.

Ultrasonics, Infrasonics, Acoustics38. Electrodynamic Compensation Method of Calibrating Infrasonic Hydrophones

"Calibrating Infrasonic Hydrophones by the Electrodynamic Compensation Method," by A.N. Golenkov, Trudy Institutov Komiteta Standartov, Ser 1 Izmeritel'nykh Priborov pri Sovete Ministrov SSSR (Proceedings of the Institutes of the Institutes Under the Council of Ministers USSR), No 61(121), 1962, pp 47-57 (from Referativnyy Zhurnal--Metrologiya i Izmeritel'naya Tekhnika, No 2, Feb 63, 2.32.316)

A description is given of a model developed by the VNIIFTRI (All-Union Scientific-Research Institute of Physicotechnical and Radio Engineering Measurements) for calibrating infrasonic hydrophones by determining the sonic pressure exerted in the chamber after the external electromagnetic force has been compensated. The determination of the acoustic impedance of the system, which is ordinarily used in the most commonly known methods of calibration, becomes superfluous here. The compensation of the sonic pressure is done by the diaphragm of an electrodynamic transducer, the change of position of which is shown on a dial. According to the indication, the diaphragm is immobilized under the simultaneous effect of the sonic pressure exerted outside the chamber and the known electrodynamic force directed within it. With such a compensation, the impedance approaches infinity. A detailed description is given of an apparatus which used the usual infrasonic devices, as well as special amplifiers, cathode followers, and an immobility indicator for the diaphragm of the compensating transducer which is 0.6 mm thick and about 130 mm in diameter.

Results are given of a static calibration of the compensating transducer, of a determination of the sensitivity of the compensating circuit, and of an estimate of the accuracy of the hydrophone calibration. The mean square error of the series of measurements (no less than 12 tests) did not exceed 2.3 percent.

39. Institute of Metrology Device for Reproducing Unit of Sonic Pressure

"The Reproduction and Storage of a Unit of Sonic Pressure," by N. A. Kaluzhinova, Trudy Institutov Komiteta Standartov, Ser. 1 Izmeritel'nykh Proborov pri Sovete Ministrov SSSR (Proceedings of the Institutes of the Committee on Standards, Measures, and Measuring Instruments Under the Council of Ministers USSR), No 61(121), 1962, pp 23-28 (from Referativnyy Zhurnal -- Metrologiya i Izmeritel'naya Tekhnika, No 2, Feb 63, 2.32.313)

A description is given of a method used at VNIIM (All-Union Scientific-Research Institute of Metrology) for reproducing the unit of sonic pressure by using a sound-measuring disk in a field of standing sound waves, which has proved to be the most reliable method for an absolute measurement over almost the entire range of sonic frequencies (20-12,800 cycles per second). An equation is derived for determining the magnitude of the sound pressure at the node of a standing wave. The Acoustics Laboratory at VNIIM conducted a detailed analysis of the possible error of the formula with respect to various factors and found that it lies within the admissible limit of 1.5 percent. The device considered for reproducing the field of standing waves consists of three horizontal brass tubes. At one end of each tube is a radiator, the other end being terminated in a solid wall, part of which makes up the diaphragm of the microphone. A sound measuring disk is attached at the middle of each tube. The measurement in the tubes is done at uneven resonances according to the equation

$$\lambda = \frac{2l}{2N-1}$$

where λ is the sonic wave length; l is the length of the tube; N is a successive series of numbers (1,2,3, etc.). In this case, the antinode of the standing wave ($p=0$) is exactly at the center of the tube, where the sound-measuring disk is also located.

The node of the standing wave and, consequently, the highest sonic pressure are at the end of the tube where the microphone is located. The characteristics are given for the assortment of sound-measuring glass disks and quartz-filament suspensions with which the apparatus is supplied. It is shown that the sensitivity of the disk-filament system depends on the sign and elastic constant of the suspension filament. A correction factor is derived which accounts for the inertia and the diffraction of the disk, the influence of the proximity of the tube walls on the turning moment of the sound-measuring disk, and the sound-absorption constant in the tubes. It is pointed out that for a period of many years the error in the reproduction of the unit of sonic pressure has not exceeded 1.2 percent in the frequency range of 20-7,800 cycles per second and 3.0 percent in the range 7.0-12.8 cycles per second.

40. Cork-Gypsum Sandwich for Ultrasoundproofing

"An Interferential Absorber of Ultrasonic Energy," by Yu. V. Rublev, R. V. Protopopov, and A. V. Kortnev, Nauchnyye Zapiski, Odesskiy Politekhnikheskiy Institut (Scientific Reports, The Odessa Polytechnic Institute), Vol 37, pp 9-16 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-5-24 d)

The question of a two-layer absorber for use in the designing of wide-band test probes is considered from the theoretical point of view. Formulas are obtained which can be used to select material and thickness of the intermediate layer for an interferential absorber, which will guarantee the formation of a traveling wave in a wave guide. An example computation is given of an absorber for a nickel wave guide for the case where glycerine is used as the intermediate layer. It is found that, for such a case, the best results are obtained with cork and gypsum.

41. Calibrating Thermoacoustic Probes

"Calibration of Thermoelectric Devices Which Measure the Intensity of Ultrasound," by A. V. Kortnev, Z. N. Gardymova, R. V. Protopopov, and Yu. V. Rublev, Nauchnyye Zapiski, Odesskiy Politekhnikheskiy Institut (Scientific Reports, The Odessa Polytechnic Institute), Vol 37, 1962, pp 54-59 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 12, Dec 62, 12-5-23 yu)

In a theoretical discussion of the question of calibrating thermoacoustic probes, it is pointed out that a method of topographical mapping, using a system of coordinates, can be used to determine, in comparable units, the distribution of intensity at certain distances from the transducer; then the obtained energy values are added together, and this sum is compared with the energy measured by any absolute method, such as a calorimetric method. The coefficient of proportionality is then the sensitivity of the probe.

Information is given on the method of calibrating the probes which consist of differential thermocouples, the hot ends of which are coated with BF-2 polymerized adhesive.

42. Wave Propagation in Wave Guide With Two Ferrite Plates

"Electromagnetic Waves in a Rectangular Wave Guide With Two Ferrite Plates," by D. N. Pokusin; Moscow, Radiotekhnika i Elektronika, Vol 8, No 1, Jan 63, pp 73-83

The results of calculations of the attenuation of electromagnetic waves in a rectangular wave guide containing two transversely magnetized ferrite plates are presented. The author analyzes the effect of the magnetizing field, the thickness of the plates, and the frequency of the electromagnetic field on the phase velocity of different types of waves and investigates the relationship of the structure of the field to the above values. The author concludes that there exist different types of waves in the wave guide with respect to the region of values of H . It is also shown that the nature of the waves depends essentially on whether the thickness of the ferrite plates is greater or less than a certain boundary value for a particular dielectric constant. This boundary value is equal to the thickness of the plates at which a slow wave originates in the absence of a magnetizing field. The author notes that the data obtained here may be used in the design of ferrite devices.

43. Computing Metric Wave Propagation Over Mountainous Routes

"The Diffraction of Electromagnetic Waves by Wedge-Shaped Obstacles," by Ye. M. Khomyak and Ch. Ts. Tsydygov, Kratkiye Soobshcheniya Buryatskogo Kompleksnogo Nauchno-issledovatel'skogo Instituta No 3, 1962, pp 119-124 (from Referativnyy Zhurnal -- Radiotekhnika i Elektrosvyaz, No 1, Jan 63, 1 A 126)

Simultaneous experiments and computations were conducted on the propagation of metric waves diffracted by a shielding obstacle such as mountain peaks. In certain cases, a considerable increase of the diffraction by comparison with that over a level surface was observed. In the majority of practical cases, the path of propagation of the waves includes more than one peak. Tests were conducted to determine the most suitable practical method for computing such paths. It is considered possible to extend the calculation method for a single wedge successively for each peak and to represent the attenuation factor or the entire field over the route, by comparison with free space, in the form of the product of the attenuation factors of the separate peaks. In many cases, this method provides very good agreement of theory and practice, although there is still need for strict theoretical foundation and experimental testing at various frequencies and over various route profiles.

"Two-Screen Helix Delay Line," by V. S. Brykov; Moscow, Radiotekhnika i Elektronika, Vol 8, No 3, Mar 63, pp 433-437

An analysis is made of a delay line consisting of two anisotropically conducting screens between which is located a helix. It is assumed that the anisotropic conductivity of the screens is infinite in the direction of the z axis and zero around the circumference, while the helix has infinite conductivity in the direction of the turns. Dispersion equations and delay relationships are derived.

It is shown that the delay in a two-screen line at very low and intermediate frequencies is greater than in a single-screen line of the same dimensions.

45. Resonance Scattering of Radio Waves by Satellite Trails

"Resonance Scattering of Radio Waves by Artificial Earth Satellite Trails," by Yu. S. Sayasov and L. A. Zhizhimov; Moscow, Radiotekhnika i Elektronika, Vol 8, No 3, Mar 63, pp 499-501

The authors examine the phenomenon of resonance scattering of radio waves by the trails of artificial earth satellites. It is pointed out that, from the viewpoint of scatter properties, the region of the trail is analogous to attraction potential in quantum mechanics; that is, stationary states may exist, and if one of these is close to zero, the scattering of particles at such a potential may have resonance characteristics. Principles of quantum mechanics may also be used to establish conditions for the existence of natural oscillations in regions of reduced electron concentrations. If the dimensions of the region are approximately identical in all directions, resonance oscillations will exist only if these dimensions are of the same order as the critical wave length. If the region is cylindrical, natural oscillations always exist. The authors note that the variety of phenomena and variations of effective surface of radar scattering observed in the scattering of radio waves by satellite trails may possibly be linked to the fact that natural frequencies of a trail are absent if the length of the trail and the relative change in electron concentration are small.

"The Doppler Effect in Movement Through a Medium With Discontinuities," by G. D. Yakovleva, O. I. Yakovlev, and A. I. Rogashkova; Moscow, Radiotekhnika i Elektronika, Vol 8, No 3, Mar 63, pp 416-424

A method is described for analyzing the doppler effect for the movement of a receiver through the discontinuities of a medium, when the change of dielectric constant in the discontinuity is small in comparison with the dielectric constant of the surrounding space. An expression is given for the doppler frequency shift when the receiver is moved within discontinuities having spherical and cylindrical shapes. The case of a statistically discontinuous medium is also considered.

It is found that in a medium with a smoothly changing dielectric constant there occurs a frequency shift without a change in the signal spectrum, while in a medium with discontinuities there occurs not only a significant frequency shift, but also a broadening of the signal spectrum.

Miscellaneous

47. High Frequency Photography

"The Secret of the Illuminating Electron Mosaic," by F. G.; Budapest, Nepszeru Technika, Vol XI, No 9, Sep 62, pp 268-269

The author describes a high-frequency photographic process developed by Szemjon Kirlian, an electromechanic of Krasnodar, who discovered it accidentally. The process consists of placing a photosensitive negative on the part of the body which is to be photographed. The film is touched with a steel tipped rod having a cylinder made of some insulating plastic, with electric wiring running through the cylinder. When high-frequency current is switched on, there is a soft crackle, and the picture has been taken.

The mechanics and his wife have taken out 14 patents on their process. As a result of their work, an image of the object or live tissue which has been placed in the field of the high-frequency current can be observed directly through a microscope. Many of the objects photographed in this way reveal unusual textures and appear to be surrounded by flames or actually burning.

Automatic Control Engineering, Computers48. Safe Launch and Vibrational Flight Stability of Winged Rocket

"On the Limits of Transient Regimes in a Five-Dimensional System of Automatic Control," by R. P. Parsheva; Moscow, Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 154-160 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-93 yu)

Using the example of a guided winged rocket (with liquid-fuel jet engine and air-speed stabilizer), the study considers a five-dimensional autonomous automatic control system with one nonlinearity, guided by an autopilot with rigid feedback and three-dimensional field of angular control, angular velocity, pitching moment and deviation of the flight altitude from a given value. A finite region is determined, into which each trajectory falls after a fixed launching period, which is independent of the trajectory, provided the trajectory was in this region only at the time of take-off. That region is also determined which, in the case of $t \geq T$, contains no trajectories. These two regions afford the possibility of determining the safety limits for the launching of the rocket and the vibrational limit with altitude of the horizontally flying winged rocket.

49. Longitudinal Stability of Jet Fighter Autopilot With Time Lag

"Longitudinal Stability of an Aircraft With an Autopilot With Lag," by V. S. Kislyakov; Moscow, Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 115-123 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-195 f)

The Krylov-Bogolyubov asymptotic methods were used to study the longitudinal stability of the short-period motions of an aircraft controlled by an autopilot, with time lag taken into account. It is shown that the admissible lag value (τ_{adm}) of the autopilot is determined by the values of the coefficients M_Z^w and M_Z^{δ} , which determine the selection of optimum autopilot transmission ratios. An example analysis for the estimated admissible lag time of a jet fighter indicates that the accuracy of an estimate given by B. S. Razumikhin (based on a stability study by Lyapunov) is low by comparison with the accuracy obtainable by the Krylov-Bogolyubov method.

"On Computing Accelerometers With Compensation Forces," by L. A. Dmitrochenko; Moscow, Trudy Moskovskogo Aviatsionnogo Instituta (Proceedings of the Moscow Aviation Institute), No 147, 1962, pp 51-61 (from Referativnyy Zhurnal - Avtomatika, Telemekhanika i Vychislitel'naya Tekhnika, No 1, Jan 63, 1A61)

Using the transducer circuit of a linear accelerometer as an example, the relationships between the design parameters of the magneto-electric mechanism and the general static and dynamic characteristics of the transducer are investigated. A method of damping the oscillations of the suspension system is investigated; a principle and a structural circuit diagram are given for the accelerometer, and formulas are derived for computing accelerometers with elastic suspension systems.

51. "Frequency Relay" Reported By Kazan' Aviation Institute in 1960

"A Frequency Relay," by I. Ye. Mitrofanov; Trudy Kazanskogo Aviatsionnogo Instituta (Proceedings of the Kazan' Aviation Institute), No 59, 1960, pp 81-96 (from Referativnyy Zhurnal - Avtomatika, Telemekhanika i Vychislitel'naya Tekhnika, No 1, Jan 63, 1 A 43)

A description is given of a frequency relay (ChR) which "fixes" the frequency characteristics of pulses and performs a number of other functions in engineering. The relay can be used with electron tubes and thyratrons, with considerable promise shown by the use of thyratrons with cold cathode. The relay circuit is simple, yet has a wide tuning range (particularly useful when the use of resonance devices involves difficulties) and a sharp resonance curve. Oscillograms are given for the response characteristics of the relay, and circuit analyses are provided for the conditions where both tubes conduct and when only one conducts. The results of the experiments and the calculations based on derived formulas were in good agreement.

Optimal Control of Dynamic Systems with Damping-
Factor Limitations

"On Obtaining Optimal Processes in Second-Order Dynamic Systems," by A. V. Repnikov; Trudy Moskovskogo Aviatsionnogo Instituta, No 147, 1962, pp 27-34 (from Referativnyy Zhurnal-Avtomatika, Telemekhanika, i Vychislitel'naya Tekhnika, No 1, Jan 63, 1A233)

The problem is considered of designing optimum high-speed processes in dynamic systems, the control of which can be introduced in the form $q + 2v \dot{q} + a = 0$, where v is the damping factor of the system. In real systems, the change of the (damping factor is limited by the accuracy of system, the parameters of the energy carriers, the saturation of the characteristics of the elements, etc. It is assumed that the coefficient v (damping factor) is limited by the conditions $v_{\min} \leq v \leq v_{\max}$, whereby $v_{\max} \geq 1$.

The following problem is posed: When limitations are placed on the damping factor, it is necessary to establish an optimum process of adjustment which, where perturbation exists as a single impulse, has no overshoot and occurs in the shortest possible period of time.

The solution is obtained by the phase-space method with the use of correction devices, the signal of which is formulated not with respect to speed, but with respect to the extremum of the process control value. To guarantee an optimum process, the damping factor should be held at the limiting value and, during the process, be changed from its minimum to its maximum value, i.e., a retuning of the system is necessary. It is shown that the optimum lead factor is unequivocally determined by the limiting value of the damping factor. Functional and principal circuit diagrams are given for a correction device which will guarantee an optimum process. When a time lag exists in the correction device, the lead factor has to be corrected accordingly. This is done by the use of a correction factor expressed by the given time lag of the correction device and the limiting value of the damping factor. When dry friction exists in the system, the optimum lead factor is determined not only by the limiting values of the damping factor, but also by the extremum of the process control value.

53. Control-Action Coupling in Systems of Combined Servo Control

"An Approximation Method of Computing Control Action Couplings In Systems With Combined Control Based On Incomplete System Data," by V. G. Terskov; Trudy Moskovskogo Aviatsionnogo Instituta, No 146, 1962, pp 71-91 (from Referativnyy Zhurnal - Avtomatika, Telemekhanika i Vychislitel'naya Tekhnika, No 1, Jan 63, 1A175)

The method of computing and designing control-action coupling in systems with combined control is most suitable for the modernization of already designed and operating servo systems. Two cases are considered here: the first requires, for computing the coupling operator, a knowledge of the Q-factors for the speed and acceleration of the master system, as well as the amplification factor of that part of the direct line extending from the error signal to the input point of the perturbation signals. It is shown that in this case the introduction of control-action coupling guarantees increased order of magnitude of the astatism by a factor of four.

The second case of computing the coupling operator requires a knowledge of the frequency characteristic of the closed system without perturbation couplings, the system Q-factor with respect to the speed and amplification factor of that part of the direct line extending from the error signal to the input point of the perturbation couplings. In this case, the introduction of control-action coupling guarantees an astatism of the system no lower than the fourth order of magnitude, provided the frequency characteristic is nearly flat in the frequency range from zero to the cutoff frequency.

54. Algorithm for Synthesis of Abstract Automata

"Certain Problems Involved in the Synthesis of Abstract Automata," by Ya. M. Barzryn'sh; Uchenyye Zapiski. Latvyskiy Universitet (Scientific Reports. The University of Latvia), Vol 41, 1961, pp 51-62 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-110 yu)

For the synthesis of an abstract automation, an algorithm is given which is based on a description of the events which occur in finite automata as a consequence of characteristic subevents. The notion of the "substant B" is introduced, which is a particular generalization of the notion of the finite automation, under which is understood an object with finite number $m \geq 1$ of states b_1, \dots, b_m and finite number $n \geq 1$ of inputs x_1, \dots, x_n , whereby certain pairs (x_k, b_i) have such a property that, under the effect of x_k , the substant B is transformed from state b_i to state $b_1 = x_k b_i$ (the transition $x_k b_i$ occurs in B).

55. Attenuation of Transients in Synthesis of Control Systems

"On One Method of Synthesizing Control Systems," by A. I. Moroz; Moscow, Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 124-135 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-70 ya)

The method was suggested by A. M. Letov (not further identified). Having a system of differential equations describing the controlled plant

$$\dot{\eta}_k = \sum_{\alpha=1}^n b_{k\alpha} \eta_\alpha + m_k \xi \quad (k = 1, \dots, n),$$

where η_k represents the generalized coordinates of the plant, and ξ is the coordinate of the controller (the coefficients $b_{k\alpha}$ and m_k are assumed to be given), and given the initial points $M^0 (\eta_1^0, \eta_2^0, \eta_n^0, \dots, \xi^0)$, it is necessary to find the law of control for the plant in such a way that the image point moves from the initial position to a sphere of arbitrary radius at a given time t^* , and for all $t > t^*$ remains inside this sphere.

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It is shown that, when the system is adjoined by the integral of the form $R^2(\xi, \eta) = R_0^2 e^{-2t}$, where $R^2(\xi, \eta)$ is a positive function which reverts to zero only at point (0,0) and $\rho = \text{constant}$, the method provides a solution of the system whereby the image point in the phase space of the variables $\eta_1, \eta_2, \dots, \eta_n, \xi$ moves to the axis $\xi = 0$ and remains there, which means that there is no further attenuation of the transient process, and, consequently, the problem is not solved.

The problem is solved when ρ is a function of ξ , chosen by a particular method, and the initial position in the phase space is selected so that $|\xi_0| \geq \xi_{\text{fix}}$. In the case $|\xi_0| < \xi_{\text{fix}}$ the transient process in the closed system (plant-controller) decays more rapidly than when the controller is absent, but the degree of this attenuation is never as desired. It is shown that, if $R^2(\xi, \eta)$ is chosen from those coordinates which return to zero not only at the origin of the coordinates, then, by selecting $\rho = \text{const}$, the degree of attenuation can be made as large as desired; consequently, in this case, the problem posed can be solved.

56. Frequency-Code Telecontrol System for Hoists and Cranes

"Radio Control of Hoisting and Transporting Machines," by Ye. Ya. Grushko; Trudy Vsesoyuznogo Nauchno-issledovatel'skogo Instituta Pod'emno-Transportnogo Mashinostroyeniya (Proceedings of the All-Union Scientific-Research Institute of Hoisting and Transportation Machine-Building, VNIIPTMash), No 1, (12), 1961, pp 35-43 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-128 n)

VNIIPTMash has produced what it calls the first frequency-code system of telecontrol, which operates with a one voice-frequency channel imposed on a radio channel. It was found that controlling cranes by radio is optimum with a frequency-modulated signal in the range 25-45 megacycles per second. The operation of the frequency-code system in the telephone channel (400-2,500 cycles per second) afforded the possibility of using for the radio control a commercial radio installation with a uniform frequency characteristic in this range, which provides an output signal level sufficient for operating a telecontrol receiver with nonlinear distortions not in excess of 10 percent. The shifting of the voice frequencies in and out of the radio spectrum is done with the ZhR-4 radio installation used for dispatcher service on the railroads.

57. Radiation Thermometer in Automated Industrial Furnaces

"A Radiation Thermometer," by I. D. Semikin, V. S. Kostogryzov, and O. I. Tsygankov; Sbornik Nauchnykh Trudov. Institut Avtomatiki Gosplana USSR (Collection of Scientific Works. The Institute of Automation of the State Planning Committee Ukrainian SSR), No 2, 1962, pp 153-164 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dev 62, 12-2-53 k)

A description is given of an instrument used to measure the radiation heat fluxes in automated industrial furnaces. The operating principle is the measurement of the temperature drop produced at a thermistor by a heat flow from the radiator and sensed by a radiation detector. The detector is a model of an absolutely black body in the form of a slot in the wall of an opaque hollow body insulated on the outside from the ambient medium. The detected heat flows out along a rod, the end of which is cooled. The temperature drop at the rod is measured by a differential thermocouple.

It is shown that the electromotive force of the thermocouple is proportional to the radiation heat flux, and the error resulting from the radiation of the detector into the ambient medium is practically imperceptible.

The design and static characteristics of the radiation thermometer and the equipment used to study it are described; the time constant of the thermometer is determined, and a description is given of the method of determining the influence of the cooling conditions on the indications of the thermometer, and of determining the optimum distance from the thermometer to the heat-radiating body.

58. Programmed Control With Frequency Separation of Channels for Industrial Automation

"A System of Programmed Control With Frequency Separation of Channels," by V. N. Shadrin; Moscow, Avtomaticheskoye Regulirovaniye i Upravleniye (Automatic Regulation and Control -- a collection of articles), 1962, pp 161-166 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-66 s)

The program can be recorded on punched cards, punched tape, film, magnetic drum or magnetic tape, the latter being preferable. The recording on the magnetic tape can be continuous or discontinuous (pulsed), the former using the FM principle. Control of a machine tool with three coordinates on tape requires a recording of four signals (one reference or calibrating and three operational). Two signals are required to control

the maintenance operations (lubrication, cooling). The signals are recorded by multitrack recording or with different carrier frequencies. The operating frequencies range within 400-500 cycles per second, and the carriers within 1,300-5,000 cycles per second. A block diagram and principal circuit diagram are given for the programmed control system with frequency separation of channels.

In discussion of the problems of accuracy and interference stability, it is shown that greatest accuracy results from reducing the intermodulation distortions and the error of the rotary transformer, and increasing the transmission ratio of the drive. The programmed control system with FM and frequency separation of channels is recommended for the control of production processes in industry which do not put high demands on accuracy.

59. New EMSS-7 Analog of the Ukrainian Computer Center Inconvenient To Use

"On the Solution of Problems of Structural Mechanics With the Use of T- and Pi- Equivalent Circuits," by K. K. Keropyan and N. N. Kholmogorov; Trudy Rostovskogo Inzhenerno-Stroitel'nogo Instituta [Proceedings of the Rostov Engineering-Construction Institute], No 23, 1961, pp 87-101 (from Referativnyy Zhurnal - Avtomatika, Telemekhanika i Vychislitel'naya Tekhnika, No 1, Jan 63, 1 B 299)

The Computing Center of the Academy of Sciences Ukrainian SSR has produced a new analog, called the EMSS-7, which is used at present for the solution of rod systems problems in construction engineering. The EMSS-7 is based on a nonsymmetrical Pi-circuit analog of a bent rod; studies have shown, however, that there exists one class of problems in structural mechanics which cannot be solved by means of a nonsymmetrical Pi-circuit analog, because it differs so from the mechanical system. Additional problems are cited, which can be solved with the analogs EMSS-1, 5, 6, and 7, and the possibilities of using these analogs are examined. Two circuits which stimulate a bent rod are considered to establish the connection between T- and Pi-circuit analogs; Kirchhoff equations are used to derive formulas for the conversion of the parameters of T-circuits to the parameters of Pi-circuits and vice versa. It is pointed out that a T-circuit solves a complete system of canonical equations, which cover almost all the problems of structural mechanics. It is also shown that the analogs EMSS-5 and EMSS-6 have broader possibilities than the new EMSS-7. The case of a restricted torsion of caissons is analyzed in detail, and results are given of an experiment conducted with the EMSS-5 and EMSS-7 analogs. Representative problems were solved for a three-span parabolic arc under bending stress, a three-span unflitched beam under

restricted torsion, and a three-section thin-walled shell under restricted torsion. An analysis of the results indicates the wider range of equivalent T-circuits and the inconvenience in using the EMSS-7 analog because of the necessity of changing the scale. A comparison of the different analogs indicates that the EMSS-5 and the EMSS-6, provided they are modernized, are preferable to the newer EMSS-7.

60. Analog Study of Buckling of Cylindrical Rods

"Using the Electrical Modeling Method To Solve the Problem of the Buckling of Cylindrical Rods," by L. G. Naumova and G. Yu. Stepanov; Moscow, Doklady 4-y Mezhvuzovskoy Konferentsii po Primeneniyu Fizicheskogo i Matematicheskogo Modelirovaniy v Razlichnykh Otrastlyakh Tekhniki. Sbornik 1 (Reports of the Fourth Inter-VUZ Conference on the Use of Physical and Mathematical Modeling in Various Fields of Engineering. Collection of Articles 1), 1962, pp 71-81 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-1-115 ts)

It is shown that the solution of the problem of the buckling of cylindrical rods of a given cross section is reduced to a determination of the Saint Venant function φ and to the solution of the Dirichlet problem for the function Ψ , which is harmonically conjugate to φ . It is pointed out that the function φ can be determined by conformal transformations, whereby the conformal relationship is established point by point by means of electronic modeling on a simple analog, the design and operation of which were explained by G. Yu. Stepanov at the May 1957 conference. The method of computing the maximum stresses produced at the edges is discussed for the case of a rod with elliptical cross section.

61. Three Types of Models for Determining Current Distribution in Steel Bath

"Modeling the Distribution of Electrical Current in the Metal Bath of a Large-Capacity Steel-Melting Furnace," by P. P. Cherdovskikh; Moscow, Doklady 4-6 Mezhvuzovskoy Konferentsii po Primeneniyu Fizicheskogo i Matematicheskogo Modelirovaniy v Razlichnykh Otrastlyakh Tekhniki. Sbornik 1. (Reports of the Fourth Inter-VUZ Conference on the Use of Physical and Mathematical Modeling in Various Fields of Engineering. Collection of Articles 1), 1962, pp 183-195 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-1-125 d)

For the study of the distribution of current in the metal bath of a large-capacity steel-melting furnace, a method is given which is based on the use of three-dimensional metallic, hollow, and two-dimensional models.

This affords the possibility of finding the approximate values of the modulus and phase of the density of current, voltage, and of the electric and magnetic fields at various points within the bath. A brief description is given of the design of the metallic models, and an analysis is given of the experimental data obtained. The characteristics of the three types of models are compared, and the most appropriate areas of use of each are discussed.

62. Electrical Analog of Rod-Frame System With Several Degrees of Freedom

"Certain Questions Involved in the Electrical Modeling of the Problems of the Statistics of Rod Systems," by V. M. Kondrat'yev; Trudy Tashkentskoy Instituta Inzhenerov Zheleznodorozhnogo Transporta (Proceedings of the Tashkent Institute of Engineers of Railroad Transport), No 22, 1962, pp 139-154 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-1-116 shch)

For a floating frame, an electrical circuit-analog is given which is based on active four-terminal networks with crossed outputs; the conditions of similarity are formulated, and an example is given of the simulated design. The possibility is demonstrated of producing electrical analogs of floating frames, the shorted loops of which have several degrees of freedom. It is pointed out that, in a number of cases, the equilibration of the electrical circuit is such a difficult operation that it is more feasible to use the method of deformations, for which two examples are illustrated.

"Electrical Modeling of the Problems of the Stability of Plane Rod Systems," by V. M. Kondrat'yev; Ibid, pp 121-138 (Ibid, 12-1-117 n)

For a compressed rod, the basic equations are given, along with an equivalent circuit containing an active T-shaped four-terminal network. Formulas are given for determining the parameters of this four-terminal network, into which negative resistances can be introduced by connecting up an additional power source. Examples are given to the electronic analogs of fixed and floating frames. An approximation method is given for computing the stability of complex fixed frames, and a two-step method of modeling is described for studying the stability of complex floating frames.

63. Structural Occurrence Pattern of Nouns and Verbs in Georgian, Russian, German Texts

"On the \mathcal{E} -Structure of the Distribution of Intervals," by T. G. Gachechiladze, G. N. Tsertsvadze, and G. B. Chikoidze; Trudy Instituta Elektroniki, Avtomatiki i Telemekhaniki AN GruzSSR, (Proceedings of the Institute of Electronics, Automation and Telemechanics, Academy of Sciences Georgian SSR), No 2, 1962, pp 3-15 (from Referativnyy Zhurnal - Avtomatika i Radielektronika, No 12, Dec 62, 12-1-151 g)

A statistical method of linguistic analysis is suggested which is based on an idea of V. Yngve. Specific types of words (in the given case, nouns and verbs) are selected; the frequency of occurrence of these in a text is computed, as is the average interval between them (i.e., the number of words of another class separating the noun from the verb). The results of these calculations indicate that the distribution of nouns and verbs is not random, but follows certain structural patterns. The presence of structure (i.e., interdependences) is detected by a purely statistical method. Statistical data are given on the average probability of encountering a noun and a verb, on the average length of the intervals noun-noun, noun-verb, verb-verb, and verb-noun and on the number of intervals of all four types ranging in length from 0 to 15 in Georgian, Russian, and German texts.

64. New Pneumatic Devices

"Soviet Scientists Have Succeeded"; Moscow Komsomol'skaya Pravda, 16 Mar 63, p 2

Soviet scientists have succeeded in developing a totally new class of pneumatic devices. These devices have no distinct parts. The performance of such devices is based on the interaction of air jets.

These pneumatic devices were created under the direction of Prof M. Zyzerman. The phenomenon associated with these pneumatic devices is called "jet technique."

A signal in such devices travels at a velocity close to sonic. This affords an opportunity of building computers utilizing jets of air. Creators of the "jet technique" consider that the manufacture of such devices can be fully automated. The greater part of such devices can be simply stamped. Many components for these pneumatic devices can be prepared by the method of printed circuits.

65. Automatic Interpretation of Graphs With Aid of TV Camera

"Kinescope Assists Ural Computer," by I. Kirpichnikova; Leningrad, Pravda, 6 Mar 63, p 4

Seismographic and medical graphs are now interpreted automatically with the aid of a television camera.

The Television Chair of the Electrical Engineering Institute of Communications imeni M. A. Bonch-bruyevich, under the direction of Prof P. V. Shumakov has developed a device for interpreting graphs and conversion of them into electric pulses. This device was designed by Docent S. A. Zlotnikov, Chief Engineer V. I. Frolov, and Engineer B. S. Glybin. This device can operate in conjunction with the computers "Ural" or BESM. The preliminary manual coding, which generally required from 2 to 3 weeks, can now be performed with the aid of this television device in 2 or 3 minutes.

The type with the graph is attached to a drum rotating with a speed of 400 revolutions per minute. A television kinescope tube is facing the diagram. A beam from the screen is directed on the graph.

When the beam intersects the graph on the drum, the reflected light beam excites a photo cell and generates an electric pulse, which is fed to the computer.

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This new television installation is able to read 60 graphs simultaneously.

66. URAL-1 Aids Research of Academy of Sciences of Kazakh SSR

"The Most Important Scientific Research Work of the Academy of Sciences of the Kazakh SSR in the Field of Heavy Industry of Kazakhstan," by Academician K. I. Satpayev, President of the Academy of Sciences of the Kazakh SSR: Alma-Ata, Vestnik Akademii Nauk Kazakhskoy SSR, No 1, Jan 63, pp 16-18

The author discusses the present studies on mechanization and automation of heavy industry being made by the Academy of Sciences Kazakh SSR with the aid of a URAL-1 computer. Several unrelated groups are doing this work: the institutes of Mining, Metallurgy, Power Engineering, Nuclear Physics, and the Alatysk Mining and Metallurgical Institute in Ust'-Kamenogorsk. Research is done on drilling machines and excavators and on measuring instruments used in the rolling of nonferrous metals.

In the Laboratory of Electronics and Automation optimal operating conditions for the pulverizing and floatation of ores are determined, on the basis of which automatic equipment will be built. Automatic control of the excavation of metals from ore is expected to increase the yield by at least 10%. Another field in which the Laboratory of Electronics and Automation is active is that of drawing wire for wire cables. The principles used in simulation of such operations can be applied to other fields, such as weaving and paper production.

The author complains that due to the fact that the Laboratory of Electronics and Automation is under the Institute of Nuclear Physics, the results of its investigations do not receive the proper consideration; and he suggests the formation of a new Institute of Automation and Mechanization of Heavy Industry of the republic.

67. Conversion of Geodetic Data From Digital to Binary

"Selecting the Type of Converter for a Coding Theodolite," by Yu. N. Starodumov; Moscow, Geodeziya i Kartografiya, No 1, Jan 63, pp 22-26

The article concerns a device called a "coding theodolite" for the conversion of geodetic data from digital to binary form for processing on a computer, the most suitable being the MINSK. The feature which distinguishes the equipment described from a conventional theodolite is

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the means of representing angular measurements. Instead of a dial, graduated in degrees and minutes of arc, there is a disc containing openings consisting of arcs of concentric circles. These are arranged in such a manner that a line drawn from the center of the disc to the circumference cuts a configuration of openings corresponding to a binary number which can be equated to the angle between this line and an arbitrary reference line.

The key step in the physical process of conversion consists of passing energy through the disc from a source to a sensor. There are several methods for doing this: magnetic, contact, photoelectric, and capacitive. Of these, the photoelectric method has been found to be the most satisfactory.

Accuracy is determined by the number of concentric circles in the disc, as represented by the arcs. For example, 16 would divide the circle into $2^{16} = 65,536$ sections, or about 20" of arc per section.

Due to the particular configuration of the arcs necessary for binary representation of the angular data, a slight angular variation can result in an error of 180° in the binary equivalent, simply by the interchange of a 0 and 1 in the highest position of the binary number. Several methods exist to eliminate this ambiguity, the most satisfactory being one in which the electronic equipment determines the figure (0 or 1) in some position by taking into account the value of the figure in the preceding position.

68. Solution of Problems of Oil Well Interference by Monte Carlo Methods

"Solution of Planar Filtration Problems by a Monte Carlo Method," by M. I. Shvidler; Moscow Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk: Mekhanika i Mashinostroyeniye, No 1, Jan-Feb 63, pp 141-145

The author states the problem as follows:

"The basic problem of oil well interference in regions of sufficiently complex cross section is often solved by difference methods. In this case a small increment in the geodetic grid involves a system with a large number of algebraic equations. Calculations show that in the approximation of contours of oil wells in a geodetic cross section grid the number of equations in the system can reach 10^{10} or more. Obviously, the solution of a system with such a quantity of equations is a practical impossibility. At the same time, in a majority of cases only some, rather than all, of the variables need be known. In ordinary methods for the solution of such systems (iterations, elimination of variables, etc.) it is necessary to find the complete solution, which, for a large number of unknowns and the usually slow convergence of the methods, presents considerable difficulty.

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"Therefore, in modern practice for solutions of problems of oil well interference, difference methods are used in modified form. The wells are replaced by points in which the original differential equation is approximated in such a manner that the solution of the modified system in the approximating geodetic grid in the vicinity of the wells coincides with the solution of the unmodified system. Naturally, such an approach allows a considerable decrease in the number of equations in the system. Checking shows that the accuracy attained by evaluating the output of the wells and the pressure at points sufficiently removed from the wells is completely satisfactory for practical, and often theoretical purposes. Such a system is called 'effective.'"

In this paper Monte Carlo methods are suggested for the solution of effective systems. Numerical examples, suitable for solution on a URAL-1 digital computer with a "random" number sensor, are considered.

69. Precise Operating Equations of Digital Differential Analyzer

"The Question of More Precise Operating Equations of a Digital Differential Analyzer" (presented on 15 July, 1961, by Academician Sh. Ye. Mikeladze), by R. G. Devdariani, Tbilisi State University; Tbilisi, Soobshcheniya Akademii Nauk Gruzinskoy SSR, Vol 29, No 5, Nov 62, pp 513-520

The article presents general equations for the contents of the integrator register of a digital differential analyzer and for the output signal, for increments of an independent variable Δt . In these equations $Y_i \Delta x_i$ is taken to be the product of the algebraic quantities Y_i and Δx_i , in connection with which a new concept of machine complementary arithmetic is introduced.

The contents of a register R and the output signal dz_i are given by the equations $R_i = R_{i-1} + Y_i \Delta x_i$ and $dz_i = R_{i-1} - R_i + Y_i \Delta x_i$, where R_i is the contents of register R after the i -th step of integration, and dz_i is the output signal for that step.

A table is given, showing the contents of registers and output signals after successive steps of integration.

70. Digital Processing of Measured Data

"Equipment for Digital Processing of Measured Data," by A. M. Bogomolov and V. P. Petrov; Moscow, Priborostroyeniye, No 10, Oct 62, pp 11-13

In view of the fact that there are 28 different voltage levels in output signals of measuring instruments used in centralized control systems, the authors suggest some unification of measuring instruments, the nonlinearity in the converter cannot be immediately removed. They classify digital processing of nonlinear data as follows:

1. By the type of nonlinear data -- true values in the converter and corrections in the converter
2. By the type of nonlinear approximation -- equal or unequal steps in the approximation in the converter
3. By the method of presenting the nonlinear data -- full values or incremented values in the converter
4. By an analog, digital, and counter indicator in the converter.

A method of binary coding is presented, whereby the measured data in digital form is converted to analog form and then reconverted to digital form. The final result y is obtained from a linear equation of the form

$$y = b + k_1 s_1 + k_2 s_2 + \dots + k_{N-1} s_{N-1} + k l,$$

where b is the value corresponding to the code in the initial setting of the counter used in the apparatus; k_1, k_2, \dots, k_N are coefficients of conversion for the 1st, 2d, ... nth intervals; s_1, s_2, \dots, s_N are the widths of the 1st, 2d, ... nth intervals compatible with the conversion of the scale; l is the increment of the input quantity X .

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71. Determination of Parameters in Control Systems by Analog Computers

"Use of Analog Computers for the Experimental Determination of the Parameters of Dynamic Links," by V. M. El'yasberg, Leningrad Electrotechnical Institute imen V. I. Ul'yanov (Lenin); Leningrad, Izvestiya Vysshikh Uchebnykh Zavedeniy: Priborostroyeniye, Vol 6, No 1, 1963, pp 38-46

A method is described for using analog computers for the experimental determination of parameters of linearized dynamic links in an automatic control system. The method is based on the reproduction by a computer of a given polynomial in t .

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72. Invariance of Automatic Control Systems

"Information Conditions for the Invariance of Linear Automatic Control Systems" (presented by Academician B. N. Petrov on 23 July 1962), by I. D. Kochubiyevskiy and G. M. Ulanov; Moscow, Doklady Akademii Nauk SSSR, Vol 148, No 6, 21 Feb 63, pp 1268-1270

In the article an attempt is made to relate the theory of information and statistical optimization to the determination of conditions of invariance. Information conditions for the invariance of automatic control systems are considered.

In general, an automatic control system can be considered as a system for the transformation of information. Expressions for the frequency characteristics are found for a two-channel system.

73. Logic Algebra of Multitact Circuits

"The Logic Algebra of Multitact Circuits," by E. Yakubaytis, Institute of Electronics and Computer Engineering, Academy of Sciences of the Latvian SSR; Riga, Izvestiya Akademii Nauk Latvyskoy SSSR, No 11, 1962, pp 35-40

A method for describing a multitact circuit is considered which is based on an algebraic transformation of a switching function, expressed as $A_{k\tau}(t) = A_k(t - \tau)$, ($t \neq \infty$). A_k is the input signal from the initial time to the moment of switching. $A_{k\tau}$ is the output signal after switching. τ is the time at the moment of switching.

Several examples of switching circuits are given, showing various uses of AND, OR, and NOT logical operations.

Electrical Engineering74. High-Frequency Rotary Electric Generator

"Rotary Electric Generator of Ultrasonic Frequencies," by L. F. Kolomeytsev; Novochoerkassk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika, No 1, Jan 63, pp 132-133

A three-phase rotary electric generator producing sinusoidal current with a frequency of 30 kilocycles was designed and built at the Chair for Electric Machines and Apparatus of Novochoerkassk Polytechnic Institute.

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This generator is intended to supply power to fast-operating computers, built with ferrite-diode elements. This generator was tested for a period of 2,000 hours and proved to be superior to tube generators. The rotor of the generator is 300 millimeters in diameter and is 60 millimeters long. Voltage output of the generator is 180 volts. It was shown that such rotary electric generators can compete with tube generators in a frequency range from 10 to 30 kilocycles.

75. Transistorized Frequency Converter

"Analysis of Transistorized Frequency Converter With Biased Intermediate Transformer," by I. F. Il'inskiy, Moscow Power Engineering Institute; Moscow, Elektrichestvo, No 2, Feb 63, pp 18-26

Transistorized converters of dc voltage into rectangular ac voltage are used to regulate speed of electric motors by varying the frequency of applied voltage. Such conversion of dc voltage into controlled frequency ac voltage is best attained with the aid of converters having biased switching elements. This type of converter permits varying the frequency in wide ranges independent of the supply voltage for a rather low level of input signal.

Both Soviet and foreign literature has very little information on the characteristics of converters with biased switching elements. Such a converter consists of an output transformer with three windings, two transistors and two biased switching transformers each with four windings. The saturable switching transformers have a core with rectangular hysteresis loop. The frequency of oscillations is determined by the saturation time of the core. Such type of converter permits to vary frequency in a range from 50 to 8,000 cps; however, the characteristics remain practically linear only in the frequency range from 50 to 1,300 cps.

Such frequency converters with intermediate biased transformers are suitable for motor speed control based on the principle of varying the supply frequency.

76. Static Frequency Converter for Speed Control of Induction Motors

"Static Frequency Converter Based On Semiconductor Power Triodes for Controlling the RPM of Induction Motors," by A. S. Sandler and R. S. Sarbatov; Trudy Moskovskogo Energeticheskogo Instituta (Proceedings of Moscow Power Engineering Institute), No 38, 1962, pp 58-71 (from Referativnyy Zhurnal - Avtomatika i Radioelektronika, No 12, Dec 62, 12-2-21 s)

The converter described consists of a control power rectifier, a three-phase inverter and an inverter-control system containing two stabilized DC-voltage sources. The control power rectifier consists of a three-phase autotransformer and silicon rectifier assembled as a three-phase bridge circuit. The semiconductor inverter is made up of three single-phase bridges, the main branches of which are connected with the power rectifiers, and the diagonals to the primaries of the output transformers. The control system includes the power source, two-triode shaper, ring counter with ferrite toruses with pronounced squareness of the hysteresis loop, repeater (six-phase pulse amplifier), and output oscillator.

77. 60th Birthday of Professor Rubinshteyn

"Yakov Moiseyevich Rubinshteyn"; Moscow, Elektricheskiye Stantsii, No 1, Jan 63, p 91

Doctor of Technical Sciences Professor Rubinshteyn was born in November 1902. At present he heads the Turbogenerator Laboratory of the All-Union Heat Engineering Institute and directs important works on testing new powerful generator units. Professor Rubinshteyn has published more than 40 scientific works. For several years he has been a member of the State Committee for Automation and Machine Building.

78. Geothermal Power Plant in Far North

"Electric Station on a Volcano"; Sovetskaya Latvya, 14 Feb 63, p 4

A group of Soviet scientists has just returned to Moscow from an expedition to Chukotka where it studied the possibility of building an electric power plant utilizing heat from an active volcano located in the region of the Yuzhno-Anyuyskiy Khrebet [South Anyuyskiy Ridge].

The scientists have concluded that such a power plant is quite feasible.

79. Novovoronezhskaya Atomic Plant Is Approaching Completion

"In the Soviet Union"; Moscow, Pravda, 17 Feb 63, p 6

Intensive construction operations are going on at the Novovoronezhskaya Atomic Power Plant in an effort to complete the first section of the plant located on the Don River during the fifth year of the Seven-Year Plan.

80. Czechoslovak Studies of New Energy Sources

Prague, Technicky Tydenik, No 11, 13 Mar 63, p 3

The Division for Electromechanical Sources of Current (Oddeleni elektromechanickysh zdroju proudu) of the Institute of Polarography of the Czechoslovak Academy of Sciences in Prague is conducting research on new sources of energy. Actual research is being done on fuel cells in which direct conversion of chemical energy into electrical energy takes place. Economical and noiseless operation of such cells, not accompanied by any wastes, would offer important potentials for use, particularly in transportation. The Kralovo Pole Machine Works in Brno, the "Bateria" (Battery) Enterprise in Slany, and the First Five-Year Plan Plant in Sumperk are cooperating in the research. (FOR OFFICIAL USE ONLY. COPYRIGHT 1963)

Measuring and Recording

81. Airborne Instrument Automatically Records Ground Relief

"Instrument for Automatically Recording Local Relief From an Airplane During Aerogeophysical Surveys," by V. F. Davydov, East Siberian Petroleum Geophysics Trust; Moscow, Razvedka i Okhrana Nedr, No 1, Jan 63, pp 52-55

Details on an improved aneroid altimeter which makes use of a recording galvanometer for readings of absolute altitude are given. This instrument and a recording radioaltimeter were employed to obtain true and absolute altitudes of the height of an airplane in topographic surveys. A block-diagram of the instrument and a figure showing topographic profiles of the relief of a locality are shown.

82. New Precision Clock

"Timekeeper," by V. Shcherbakov; Ashkhabad, Turkmenkaya Iskra, 29 Jan 63, p 4

Feodosiy Fedchenko, an associate of the All-Union Scientific Research Institute of Physicotechnical and Radio Engineering Measurements, has designed the first Soviet clock designated AChF-3. This clock is ten times more accurate than its counterpart abroad. The error of this clock is only one to two tenths of a millisecond per day. The clock is rather small. In an evacuated steel envelope, a pendulum swings on a shock-compensated suspension. Such a suspension eliminates any effect of either seismic or man-made vibrations on the accuracy of the clock. A miniature battery, of the size of a 5-kopeck coin, will supply power to the clock for 2 1/2 months.

This new AChF-3 astronomical clock will be widely used in laboratories and observatories.

83. Variable-Inductance Transducer Registers Two to Five Microns Without Amplifier

"Switching and Structural Arrangements of Inductive Transducers," by R. A. Gubanov and V. A. Bur'yan, Nauchnyye Zapiski. Odesskiy Politekhniccheskiy Institut (Scientific Reports. The Odessa Polytechnic Institute), Vol 47, 1962, pp 70-78 (from Referativnyy Zhurnal-Metrologiya i Izmeritel'naya Tekhnika, No 2, Feb 63, 2.32.49)

Transducers designed by the authors are described. Unlaminated, machined magnetic circuits are used which are fed by 50-cycle industrial power supply or from a transformer with frequencies of 200, 400, or 800 cycles per second. To eliminate misalignment of the armature as a result of free play, the armature is provided with an elastic mount consisting of two phosphor bronze diaphragms. These transducers can measure changes of position as small as 2-5 microns, using a scale with 100 graduations, without the use of an amplifier.

Designs are also described of flat transducers used as the sensing elements of small manometers, differential manometers and flow meters, and transducers only 10 millimeters in size for measuring in difficult accessible places.

84. Reversing Nozzle-Valve Controller for Marine Gas Turbine Engines

"On the Determination of the Discharge Characteristics of a 'Nozzle-Valve'-Type Control Mechanism," by S. B. Aksel'rod, Informatsionny Sbornik. Tsentral'nyy Nauchno-issledovatel'skiy Institut Morskogo Flota (Information Collection. The Central Scientific-Research Institute of the Maritime Fleet), No 64, 1961, pp 27-31 (from Referativnyy Zhurnal--Metrologiya i Izmeritel'naya Tekhnika, No 2, Feb 63, 2.32.552)

The force and discharge characteristics are considered for a "Nozzle-valve" type controller for the case of a reversal of the direction of flow of a liquid (inside the nozzle. These elements are used for a number of regulations in marine gas-turbine engines. A experimental apparatus is described for recording the discharge characteristics of a plan nozzle with 2-millimeter radius, and the dependence of the discharge factor of the element on the distance between nozzle and valve discussed.

85. Improving Frequency Characteristics of Hydraulic Transducers

"A Method of Studying and Means of Improving the Frequency Characteristics of Transducers for Hydraulic Measurements," by D. B. Radkevich, Dyulleten' Nauchno-tekhnicheskoy Informatsii. Vsesoyuznyy Proyektno-izyskatel'skiy i Nauchno-issledovatel'skiy Institut "Gidroyekt" (Scientific Information Bulletin. The All-Union Planning-Experimental and Scientific-Research Institute "Gidroyekt"), No 12, 1961, pp 67-71 (from Referativnyy Zhurnal -- Metrologiya i Izmeritel'naya Tekhnika, No 2, Feb 63, 2.32.510)

An experimental-theoretical method is described for determining the steady-state and phase characteristics of transducers with elastic sensing elements. The transducer is considered a linear oscillatory system. The solution of the differential equation of the forced steady-state oscillations of such a system for a sinusoidal perturbing force has the form

$$u_{din} = u_{st} \cdot U(\delta) \sin[2\pi f t + \varphi(\delta)],$$

where $U(\delta)$ and $\varphi(\delta)$ are the frequency and phase characteristics of the transducer, respectively, which are determined by the natural frequency and damping decrement of the transducer. The latter value may be determined experimentally by recording the damping natural oscillations of the transducer. In designing the metering element, it is well to strive for

a larger damping decrement in order to widen the range of operating frequencies. The method provides a means, without resorting to dynamic calibration, of determining precisely the frequency range in which the characteristics of the transducer are admissibly divergent (the phase characteristic remaining linear); of estimating the influence on the frequency characteristic of various factors, including mechanical damping; and of determining the frequency characteristics of electrical converters (with frequency correction) used to improve the dynamic properties of metering elements.

86. Temperature Error in Ultrasonic Flowmeters

"The Temperature Errors and the Calculation of Certain Parameters of Ultrasonic Flowmeters," by G. I. Birger and N. I. Brazhnikov, The Design Office for Automation in Nonferrous Metallurgy (Tsvetmetavtomatika), Moscow; Moscow, Akusticheskii Zhurnal, Vol 9, No 1, Jan/Mar 63, pp 5-9.

Purely temperature errors are considered in the case of ultrasonic flowmeters designed on the basis of a phase diagram with refraction. On the basis of this diagram, a choice of material can be made for the sound conductors, and certain transducer parameters can be computed for the purpose of reducing the temperature error and providing a satisfactory temperature compensation. Stainless steel IKh18N9T and aluminum provide excellent temperature compensation, but sharply reduce the sensitivity of the transducer, whereas certain plastics provide good transducer sensitivity but poor temperature compensation.

87. Electro-Acoustic Converter of Temperature

"Electro-Acoustic Converter of Temperature Into Frequency," by V. V. Kovalevskaya and V. K. Potapkin; Moscow, Proborostoyeniye, No 2, Feb 63, pp 11-13

The described device utilizes a method of converting temperature into frequency which is based on acoustic resonance. This electro-acoustic converter of temperature consists of an acoustic resonator which acts as a sensing element, a microphone and telephone which converts sonic oscillations into electrical and vice versa, and an amplifier.

A section of cylindrical pipe closed on both ends, in which longitudinal sonic waves are excited, forms the simplest kind of acoustic resonator. Conditions for the resonance are such that the length of the tube should accommodate a full number of half waves. Under these conditions, a standing wave originates in the tube with pressure loops and velocity nodes at the

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ends, so that the pressure at the microphone will be at its maximum. An acoustic resonator, together with the radiator and receiver of the sound, can be looked upon as a passive quadripole, coefficients of which are a function of the frequency.

The acoustic resonator is connected to the circuit of the amplifier positive feedback and acts as a frequency-dependent circuit of the electronic oscillator. Frequency of the generator, which is determined by the resonance frequency of the acoustic resonator, is a function of the temperature.

A model of such an electro-acoustic converter designed for temperature ranges from -50 to +50 degrees centigrade, is intended for meteorological purposes.

In this temperature converter, a three-stage transistor amplifier incorporating transistors P-14 with direct coupling between the stages was used, thus eliminating the need for electrolytic capacitors. Amplifier stability in a wide temperature range is ensured by introducing a strong negative feedback. The amplifier characteristics are as follows: voltage amplification factor is 25, phase shift is less than 6 degrees, power consumption is 30 milliwatts, and over-all volume of the instrument is 36 cubic centimeters.

Random errors caused by changes of resonator and amplifier parameters should not exceed 0.2% for a well-designed instrument.

An electro-acoustic temperature converter with a resonator 165 millimeters long was designed and tested at the Institute of Electro-Mechanics, Academy of Sciences USSR.

The converter sensitivity at 0°C was 1.8 cycles per degree centigrade.

The described temperature-to-frequency converter is simple in construction and is highly reliable. Depending on the size of the resonator and characteristics of the microphone, the converter can operate in a frequency range from 500 to 5,000 cycles per second with a sensitivity from one to 9 cycles per degree centigrade. The drawback of this converter is its considerable thermal constant and difficulty in measuring temperature at a single point.

88. Bismuth Transducer Utilizes Gauss Effect To Measure Magnetic Induction

"An Instrument With Bismuth Transducer for Measuring Magnetic Induction With the Use of the Gauss Effect," by G. I. Lyubchenko, Sbornik Trudov Instituta Elektrotehniki AN USSR (Collection of Works of the Institute of Electrical Engineering, Academy of Sciences Ukrainian SSR), No 15, 1961, pp 107-110 (from Referativnyy Zhurnal--Metrologiya i Izmeritel'naya Tekhnika, No 1, Jan 63, 1.32.662)

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A shop instrument is described which measures the magnetic induction in the working gap of a magnetic system right up to the metering element, as well as the distribution of magnetic induction along the operating gap (for gap widths of 1 1/2 mm). The basic operation is the utilization of the properties of bismuth to change the resistance in the magnetic field, i.e., the Gauss effect. The general circuit consists of an unbalanced bridge, one arm of which is a bismuth transducer with resistance $R_1 = 8.2$ ohms. The resistances of the bridge arms R_2 and R_4 are variable and are used to balance the bridge before measurements are taken. Resistance $R_2 = 4.9$ ohms is made of bismuth and is used to compensate the temperature error of the bismuth transducer. The bridge is fed by a flashlight battery (4 volts). The metering mechanism is connected to the diagonal of the bridge and is used both for measuring the current fed to the bridge and for measuring the magnetic induction, which is proportional to the voltage of the bridge imbalance. The bismuth transducer is made up of two series connected bismuth coils attached to the ends of probes which are inserted into two diametrically opposite points in the operating gap, which affords the possibility of measuring the total magnetic induction in the operating gap of the magnetic system. The system error amounts to 2.5 percent.

89. Gas-Thermometer Mercury-Level Indication Within 0.001 Millimeter

"A Device for the Capacitance-Fixing of the Level of Mercury in a Gas Thermometer," by K. S. Izrailov, Trudy Institutov Komiteta Standartov, Ser 1 Izmeritel'nykh Priborov pri Sovete Ministrov SSSR (Proceedings of the Institutes of the Committee on Standards, Measures, and Measuring Instruments Under the Council of Ministers USSR), No 51 (III), 1961, pp 12-22 (from Referativnyy Zhurnal--Metrologiya i Izmeritel'naya Tekhnika, No 1, Jan 63, 1.32.515)

A detailed description is given of the design and operation of a capacitance attachment for determining the level of the mercury in the manometer of a gas thermometer. The attachment consists of a stainless steel cistern 80 millimeters in diameter containing a 50-mm steel capacitor plate fixed in a quartz mount. The capacitor rating is 40 micromicrofarads, and the capacitor bridge is fed with 4 volts. The error in the measurement of the level of the mercury does not exceed 0.001 mm. The bridge circuit maintains constant capacitance, guaranteeing a corresponding change in the reading of the microscope indicator with a change of gas pressure.

90. Measuring the Air Concentration in an Air-Water Mixed Flow

"An Instrument for Measuring the Concentration of Air in an Aerated Flow," by E. A. Genina and A. M. Shvaynshteyn, Izvestiya Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Gidrotekhniki (News of the All-Union Scientific-Research Institute of Hydraulic Engineering), Vol 69, 1962, pp 125-132 (from Referativnyy Zhurnal--Metrologiya i Izmeritel'naya Tekhnika, No 1, Jan 63, 1.32.308)

A combination of electrolytic transducer and electrical laboratory instrument was developed to measure the concentration of air in an aerated flow, the transducer consisting of two stainless steel electrodes immersed in water, one electrode in the shape of a hollow cylinder carefully insulated by BF-2 adhesive, and the other electrode in the form of a spine concentrically mounted in it on an ebonite holder. The transducers were prepared in two dimensions with outside diameters of 12 and 16 millimeters; the over-all length of the transducers was 50 millimeters, and the length of the operating portion of the electrodes was 16 millimeters. The two-channel electrical instrument used with the electrolytic transducer contains a ferroresonant voltage stabilizer made from a transformer with a capacitance and resistance. The stabilized 2.5 and 5.0 volts fed to the transducers are taken from the secondary of the transformer. The measuring instrument also uses a variable resistance, with which it is possible to provide a smooth variation of the feed voltage within certain limits and thereby compensate any possible change of the transducer signal value resulting from a change of water temperature or of other disturbing factors. The vibrator of the MPO-2 oscillograph was used as a recording device. Information is given on a special device for calibrating the instrument; this device enables the establishment of a flow of water-air mixture with air concentrations of 14-70 percent. The transducer signal which corresponds to the concentration of air in the flow is recorded on the tape of an oscillograph. Test measurements indicated that the device produces accurate measurements.

91. X-Ray Spectrometer With Scintillation Counter and Silicon Crystal Analyzer

"An X-Ray Spectrometer With Scintillation Counter," by E. P. Domashevskaya, Sbornik Nauchnykh Rabot Aspirantov Voronezhskogo Universiteta (Collection of the Scientific Works of the Aspirants of Voronezh University), No 2, 1962, pp 18-22 (from Referativnyy Zhurnal -- Metrologiya i Izmeritel'naya Tekhnika, No 1, Jan 63, 1.32.279)

A description is given of the design and operating principle of an X-ray spectrometer for the study of the fine structure of X-ray spectra by means of a luminescence counter and silicon crystal analyzer. The focusing angle limits are 11-50 degrees. The breakdown of the X-rays into a spectrum and the focusing of the beams are done with a silicon crystal curved on a radius of 50 centimeters. The crystal holder is firmly attached to a lever which also provides the shift from one wave-length region to another. Once the crystal has been positioned in a region of focused lines, the lever is clamped. The precision adjustment of a second lever, which carries the control slit of the counter along the studies line, is done by means of a screw. The pointer-type dial has an accuracy of 0.0001 degree. Wave dispersion is constant in any region of the spectrum. The X-rays are recorded by a scintillation counter with a (KI (TI)) scintillation crystal with dimensions 20-25, 3-4, and 2 (thickness) millimeters, a control diaphragm, and a photomultiplier tube.

It is shown that when the counter slot is moved along a focused line, the X-ray incidence is strictly perpendicular to the surface of the crystal only at the maximum of the line, thus the X-rays in this case, take the shortest route through the crystal. Because of the comparative thinness of the crystal, however, the X-rays within a range covered by one or two lines traverse a route which is almost equal to the shortest through the crystal, even when the slit of the counter is inclined at a "profile" of the X-ray line, since the proportionality between the original distribution of intensity in an X-ray line and that observed by the number of pulses from the scintillation counter is always preserved.

A switching diagram is given for the photoelectron multiplier, which affords the possibility of releasing the thermal pulses which are produced by the thermoelectronic emission of the photocathode from the first dynodes of the photomultiplier. Dark current can be reduced by selection of the resistances of the voltage divider at the photomultiplier dynodes. The release from dark pulses affords the possibility of penetrating the long-wave region which is ordinarily difficult for the photoelectron multiplier. The spectrometer has obtained a resolution of R-5,000 in the copper band in the first order image of the silicon crystal.

92. 24-Channel Strain-Gauge Recorder With Sensitivity of 10^{-5} Units of Deformation

"An Electronic 24-Channel Strain-Gauge Installation," by D. S. Baranov, Trudy Tsentral'nogo Nauchno-issledovatel'skogo Instituta Stroitel'nykh Konstruktsiy. Akademiya Stroitel'stva i Arkhitektury SSSR (Proceedings of the Central Scientific-Research Institute of Building Construction. Academy of Construction and Architecture USSR), No 14, 1962, pp 85-95 (from Referativnyy Zhurnal -- Metrologiya i Izmeritel'naya Tekhnika, No 1, Jan 63, 1.32.196

A description is given of a multichannel strain-gauge installation for the simultaneous recording of stresses at 24 different points. Electron tube recording of signals provides instantaneous stress-strain curves. A sequential method is used to sample all of the strain gauges by feeding them one period of an 800-cps carrier frequency. Transducer pulses are recorded from the outputs of corresponding pulse amplifiers, which are activated by the voltage of the carrier frequency and remain closed until a signal from the ring commutator (started at the same frequency) opens the next amplifier. All the tensiometer bridges are connected, through transistorized distribution stages, to a general strain-gauge amplifier, the output of which is connected to the vertical plates of the electron beam tube. The horizontal plates are fed a saw-tooth voltage synchronized with the carrier frequency. This frequency is modulated by the intensity of the beam, which affords the possibility of obtaining an indication of the sign of the voltage measured at a given moment according to the sig of the unabsorbed half-wave carrier frequency. All the units of the installation are described in detail; some of the circuitry solutions are original.

The strain-gauge transducers have a resistance rating of 100-400 ohms; the transducers are fed with 20 volts at the maximum sampling frequency; the commutation rate is 800 switching operations per second; and the sensitivity of the installation is 10 comparative units of deformation. The recording can be done either with the EPP-09 automatic recorder or, with the appropriate increase in the time of the sampling cycle, with a loop oscillograph.

93. Electronic Voltmeter

"Electronic Voltmeter," by F. Ya. Izakov, Chelyabinsk Institute for Mechanization and Electrification of Agriculture; Leningrad, Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye, No 1, 1963, pp 11-18

The article describes the construction and performance of an electronic voltmeter utilizing the principle of deflection of a charged body in the field of corona discharge. This instrument, intended for measurement of high dc voltages, is simple in construction and can withstand great overvoltages.

The instrument consists of moving and stationary sections. The stationary section is made of a system of electrodes, one of which is grounded, while the other is connected to the measured high potential. The first electrode is in the form of a plate, and the second, in the form of a thin wire. The moving part consists of a conducting ball suspended from an insulating filament. The deflection of the ball is proportional to the applied dc potential; therefore, the deflection of the ball can be calibrated in kv.

The deflection of the ball in the field of corona discharge is affected by the following factors: size, shape, specific gravity, and electrical properties of the ball, the residual charge, the humidity and pressure of air, the geometry of the electric field, the sign and form of the applied potential, and the thickness and nature of the filament.

Such electronic voltmeters are designed to measure dc voltage above 15 kv directly without auxiliary resistors or capacitors and can be recommended for future high-voltage dc power transmission lines.

94. Unusually Long Soviet Abstract of US Article on Precision Measurement

"Measuring With Accuracy Down to Hundredths of a Micron" (a Russian-language abstract of the article, "Measuring in Millionths. Part I," by W. Clifford Kennedy, Machinery, Vol 68, No 10, pp 127-137) (from Referativnyy Zhurnal -- Metrologiya i Izmeritel'naya Tekhnika, No 1, Jan 63, 1.32.44)

For this US article, the Soviet abstracter V. Shvarts presented an abstract of approximately 1,600 words, which is about eight times the length of the average and nearly four times the length of the longer abstracts generally found in the Referativnyy series.

Miscellaneous

95. Training of Heat Engineering Experts

"Training of Engineers in Industrial Heat Engineering," by
B. V. Sazanov; Moscow, Promyshlennaya Energetika, No 2,
Feb 63, pp 2-5

An increased demand for graduates specializing in heat engineering has necessitated the establishment of a speciality designated as 0308.

The Moscow Power Engineering Institute (MEI) has organized a special faculty for industrial heat engineering (PIEF), which trains students in specialty 0308. These students become thoroughly acquainted with the operation of steam and gas turbines, turbocompressors, oxygen and refrigeration installations, heat supply, gas combustion, industrial furnaces, dryers, heat-exchange and evaporating installations, and utilization of waste heat. In addition, students at this faculty receive training in computer technology, electronics, and automation. The Ivanovo (-skiy) Power Engineering Institute is the only other school that has a similar special faculty for industrial heat engineering.

At other institutes, the industrial heat-engineering experts are trained at special heat-engineering chairs, which often do not provide sufficient training in industrial furnaces and gas combustion.

Although the Moscow Power Engineering Institute trains competent 0308 engineers, their improper assignment to various industrial plants, mainly on a territorial basis, greatly reduced the advantage of their training. For this reason, the state committees of the Council of Ministers USSR should take urgent measures to control the assignment of 0308 engineers to the various plants.

96. Air-Cushion Transport

"On the Air Cushion," by L. Gil'berg; Yerevan, Kommunist,
8 Feb 63, p 4

During the early thirties, Prof Vladimir Levkov of the Novocherkassk Technological Institute demonstrated the first toy model floating on an air cushion. In 1935, the world's first vehicle to travel on an air cushion was built by Levkov. In 1937, one of the "flying boats" was scheduled to participate in a polar rescue expedition, but due to an accident the plans were abandoned.

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The outbreak of World War II interfered with further experimentation on air-cushion transport. In 1953-1954, experimentation with air-cushion vehicles began in England and the US.

The 12-ton "Neva" was the first Soviet air-cushion ship, built to accommodate 38 passengers. The 17-meter ship has two fans which force 110 cubic meters of air into the cushion. The ship travels on a 7- to 8-cm air cushion at a speed of 60 km per hr.

The "Krasnoye Sormovo" shipbuilding plant has built a five-passenger boat, the "Raduga," capable of traveling 10 to 15 cm above the surface at a speed of over 100 km per hr. In the construction of this ship, the principle of confining the injected air under the ship with the aid of a compressed air shield has been utilized, which accounts for its ability to float higher above the surface than is the case with conventional design.

A 40-passenger air-cushion ship utilizing gas turbines is now in the process of design at the "Krasnoye Sormovo" plant.

The Gor'kiy Automobile Plant has built an air-cushion car, the "flying chayka." When floating on the air-cushion, the "flying chayka" travels 20-25 cm above the surface at a speed of 30 km per hr.

97. Frostproof Tests on Concrete

"An Investigation of the Resistance to Frost of Stressed Concrete," by K. A. Mal'tsov, P. G. Staritskiy, and S. S. Antonov, Izvestiya Vsesoyuznogo Nauchno-issledovatel'skogo Instituta Gidrotekhnika (News of the All-Union Scientific-Research Institute of Hydraulic Engineering), Vol 70, 1962, pp 193-197 (from Referativnyy Zhurnal -- Elektrotekhnika i Energetika, No 1, Jan 63, 1 D 147)

A new method of testing was developed at the institute, where the specimens are prepared in the form of a concrete cylinder consisting of an inner concrete core and an outer shell of the concrete to be tested. The cylinder is stressed on a special apparatus in such a way that compressive stresses are formed within the core, while tensile stresses are exerted on the outer shell. Control specimens were cylinders in which the cores were not subjected to preliminary compression. Freezing was produced at minus 17 deg C, and thawing, at plus 12 deg C. In the future, it is assumed that the freezing will be done at minus 30 deg C.

98. TsNIIGAIK Comparator Described

"Comparator of the TsNIIGAIK Experimental Optical-Mechanical Plant," by V. A. Sikachev and M. V. Meshcherskaya; Moscow, Geodeziya i Kartografiya, No 1, Jan 63, pp 32-36

The plant comparator used since 1957 at the Experimental Optical-Mechanical Plant of the Central Scientific-Research Institute of Geodesy, Aerial Surveying and Cartography [TsNIIGAIK], for standardization of all measuring tapes is described.

99. Use of Concrete Markers in Survey Nets Urged

"Reinforced Concrete Triangulation Signals in Cities," by V. N. Belkov and G. S. Gurova; Moscow, Geodeziya i Kartografiya, No 1, Jan 63, pp 27-32

The substitution of reinforced concrete triangulation signals or towers for wood and metal ones is urged. The advantages as to lifetime, maintenance, cost, etc. are compared. Several types of prefabricated concrete towers are discussed, and two are illustrated.

100. Greater Progress Called for in Topographic-Geodetic Production

"To Accelerate the Tempo of Technical Progress in Topographic and Geodetic Production"; Moscow, Geodeziya i Kartografiya, No 1, Jan 63, pp 3-6

The article briefly discusses the work done in recent years in the creation and introduction of new technology and techniques in topographic and geodetic production. It is written in the light of the November Plenum of the Central Committee of the CPSU calling for the acceleration of technical progress in USSR economy and calls for greater efforts on the part of those enterprises engaged in topographic and geodetic work.

101. Logging for Gold Deposits

"Experience of Employing Geophysical Research in Boreholes While Prospecting for Gold Deposits in Southern Yakutsk," by Ye. P. Ieman, Yu. S. Maslov, and M. A. Kholmyanskiy, Timpiono-Uchurskaya Expedition; Moscow, Razvedka i Okhrana Nedr, No 1, Jan 63, pp 46-49

Geophysical research in boreholes (logging) for gold deposits is still rather rarely used. However, logging data can give rather precise determinations of the boundaries of ore bodies and their depth. Positive results were obtained as a result of investigations of many boreholes in Southern Yakutsk gold fields, say the authors. It was found that logging considerably facilitated the problem of defining ore boundaries. The presence of sulphide ores was established by the sliding contact method /MSK/ and the method of electrode potentials /MEP/. Analogous anomalies to those caused by sulphide bodies are related to flooding, jointing, and the screening action of dolomite limestones. The combined use of the two methods (MSK and MEP) makes it possible to distinguish between ores and nonmetalliferous bodies since anomalous values of electrode potentials arise only during the intersection of sulphide bodies in the well.

These conclusions were made: (1) The use of geophysical logging proved to be very effective; (2) Primary sulphide ores containing finely dispersed gold were singled out by the combine use of MSK and MEP; and (3) The use of gamma-well logging in conjunction with the MSK makes it possible to more clearly separate zones of oxidized ores.

III. CONFERENCES

102. Recent Soviet Conference in Engineering and Geophysics

The conferences listed below were reported on announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. It is assumed that there was no non-Soviet participation in the conferences.

a. Seminar of Power Engineers of the Ministry of the Maritime Fleet USSR; September 1962, Baku. (Promyshlennaya Energetika, No 3, Mar 63, p 56)

b. Conference on the Applied Theory of the Stability of Motion and Analytical Mechanics; 6-8 December 1962, Kazan. (Vestnik Akademii Nauk SSSR, No 3, Mar 63, p 135)

c. Scientific Conference on Problems of the Use of Plastics in Construction (announcement); April 1963, Leningrad; sponsored by the Leningrad Engineering-Construction Institute. (Byulleten' Ministerstva Vysshogo i Srednego Spetsial'nogo Obrazovaniya SSSR, No 8, Aug 62, p 15)

d. Seminar on the Study of the Mechanism of Setting and the Physico-mechanical Properties of Cement; October 1962, Moscow; sponsored by the All-Union Scientific-Research Institute of Drilling Engineering, the Temporary Commission on Plugging Cements and Cementing of Wells under the State Committee of the Council of Ministers USSR for Coordination of Scientific Research Work. (Neftyanoye Khozyaystvo, No 2, Feb 63, p 62)

e. First Belorussian Conference of Tool Makers; end of 1962, Minsk; sponsored by the State Committee of the Council of Ministers Belorussian SSR for Coordination of Scientific Research Work, the Belorussian Sovnarkhoz, the Ministry of Higher, Secondary Specialized, and Professional Education Belorussina SSR, the Board of the Scientific-Technical Society of the Belorussian Machine Building Industry, and the All-Union Scientific Research Tool Making Institute. (Stanki i Instrument, No 2, Feb 63, p 45)

f. Second Scientific Conference of Geographers of Siberia and the Far East; 5-13 September 1962, Vladivostok; sponsored by the Institute of Geography of Siberia and the Far East of the Siberian Department of the Academy of Sciences USSR, the Far Eastern Affiliate of the Siberian Department of the Academy of Sciences USSR, the Bureau of Siberian and Far Eastern Affiliates and Branches of the Geographic Society of the USSR, and the Primorskiy Affiliate of the Geographic Society. (Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, No 1, Jan/Feb 63, p 148)

C-O-N-F-I-D-E-N-T-I-A-L

g. Second Ukrainian Toponymic Conference; 16-19 October 1962, Kiev; sponsored by the Institute of Linguistics of the Academy of Sciences Ukrainian SSR and the Ukrainian Toponymic Commission. (Geodeziya i Kartografiya, No 2, Feb 63, p 75)

h. Third Interdepartmental Coordination Conference on Problems of Compiling Lithological-Paleogeographic Maps; beginning of 1962, Krasnoyarsk. (Geologiya i Geofizika, No 12, 1962, p 118)

i. Second Conference of Young Geologists of the Ukraine; 17-22 April 1962, Kiev; sponsored by the Institute of Geological Sciences of the Academy of Sciences Ukrainian SSR and the Main Geology Administration of the Ukrainian SSR. (Geologichnyy Zhurnal, Vol 23, No 1, 1963, p 113)

j. All-Union Intervuz Conference on Problems of the Control of Earth Slides (announcement); May 1964, Kiev; probably to be sponsored by the Kiev Engineering-Construction Institute. (Osnovaniya, Fundamenty i Mekhanika Gruntov, No 1, 1963, back cover)

103. Conference on Use of Plastics in Construction

"On Conducting a Scientific Conference on the Use of Plastics in Construction," by V. Yelyutin; Moscow, Byulleten' Ministerstva Vysshego i Srednego Spetsial'nogo Obrazovaniya SSSR, No 8, Aug 62, p 15

The Ministry of Higher and Secondary Special Education USSR has directed that a scientific conference on problems of the use of plastics in construction be held in April 1963 in Leningrad. The conference is to be organized by the Leningrad Engineering-Construction Institute. The organizing committee for the conference will be composed of 15 members headed by Ye. N. Kvasnikov, Rector of the Leningrad Engineering-Construction Institute.

104. Forthcoming All-Union Conference on Earth Slides

Announcement, signed by the Organization Committee; Moscow, Osnovaniya, Fundamenty i Mekhanika Gruntov, No 1, 1963, back cover

An All-Union Interinstitute Conference on Problems of Controlling Earth Slides will be held in May 1964, in Kiev.

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The program of the conference calls for discussion of the following problems.

1. The nature of the strength of clay soils. Rheology. Creep and long-term strength. The effect of changes of a stressed state in slope levels, as well as dynamic forces. Selection of the computed characteristics of soils.
2. The effect of suffosion, erosion, and abrasion on slope stability.
3. The importance of geological history and geomorphological conditions in the formation of slides.
4. Types of slides and their classification.
5. Antislides structure and measures and their effectiveness.
6. Calculation of slope stability.
7. Methods of studying slides and the organization of stationary observations.
8. Methods of predicting slides.
9. Characteristics of construction in the boundaries of a slide zone.

Scientific workers and specialists of higher educational institutions, scientific research and design institutes, and production organizations are invited to take part in the work of the conference.

The works of the conference, containing reports presented for discussion, will be published and distributed to participants in advance. The Organization Committee is accepting for discussion those reports on the above-indicated problems which contain previously unpublished materials and conclusions.

Declarations of intent to present reports must be submitted before 15 January 1963, and texts of reports (two copies of no more than 10-12 typewritten pages), before 15 April 1963, in the name of the deputy chairman of the Organization Committee, Professor A. M. Drannikov, at the address: Kiev, bul'var Shevchenko, 78, Kiyevskiy inzhenerno-stroitel'nyy institut.

105. Third Conference of Geographers of Siberia and Far East in 1965

"Second Scientific Conference of Geographers of Siberia and the Far East," by N. V. Fadeyeva and B. S. Khorev; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Geograficheskaya, No 1, Jan/Feb 63, pp 148-153

The Second Scientific Conference of Geographers of Siberia and the Far East was held on 5-13 September 1962 in Vladivostok. The conference was organized by the Institute of Geography of Siberia and the Far East of the Siberian Department of the Academy of Sciences USSR, the Far Eastern Affiliate of the Department, the Bureau of Siberian and Far Eastern Affiliates and Departments of the Geographic Society of the USSR, and the Primorskiy Affiliate of the Geographic Society. President of the Organization Committee of the conference was Corresponding Member of the Academy of Sciences USSR V. B. Sochava.

It was decided that the next conference on this subject will be held in 1965, in Western Siberia.

106. Seminar on Automation in Geodesy, Photogrammetry, and Cartography

"From Activity of the Czechoslovak Scientific-Technical Society"; Prague, Geodeticky a Kartograficky Obzor, Vol 9/51, No 2, Feb 63, p 49

A seminar on mechanization and automation in geodesy, photogrammetry, and cartography will be held on 22-24 May 1963, in the geodetic lecture halls of the Department of Geodesy of the Czech Advanced Technical School in Prague 1, Husova ulice No 5. Invitations have been sent to 120 organizations to send their geodesy specialists to the seminar, which is to serve as a preparation for the conference to be held in May 1964. In the short time since the invitations were sent out, 150 delegates have applied for participation. Various organizations have indicated that they were planning special exhibits in connection with the 1964 conference.

Organizations are requested to classify delegates planning to attend the seminar sessions according to specialty, e.g., geodesy, photogrammetry, or cartography, as it would be neither practical nor economical for all delegates to attend all three sessions. The fee for attendance at one session will be 25 crowns, and for two sessions, 50 crowns. In those exceptional cases where a delegate will attend all three seminar sessions the fee will still be 50 crowns.

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Further information on the seminar may be obtained from the Organization Commission of the Preparatory Committee (Engr Bohumil Volfik, Research Institute of Geodesy, Topography, and Cartography, Prague 1, Trida Politických Vězu 12, Telephone No 22 07 23) or, as heretofore, from the Preparatory Committee of the Geodesy Conference, Prague 1, Siroka 5. (FOR OFFICIAL USE ONLY) (COPYRIGHT by the State Publishing House for Technical Literature)

[Comment: This seminar was first reported by FDD in September 1962.]

107. Polish Conferences on Isotopes in Industry

"Isotope Conferences"; Budapest, Figyelő, Vol 7, No 10,
6 Mar 63, p 7

Polish scientists have been made responsible for conducting research on the application of isotope instruments used in biological research and the isotope preparations used in medicine. As a result of this assignment, Poland is preparing to convene special conferences which will deal with the use of isotopes in the chemical, machine building, construction, and construction materials industries.

* * *

UNCLASSIFIED
Central Intelligence Agency



Washington, D C 20505

7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

A handwritten signature in cursive script, appearing to read "Sergio N. Alcivar".

Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)

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Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed by CIA and declassification guidance has been provided.

| OGA Doc ID | Job Num | Box | Fldr | Doc | Doc ID | Document Title | Pub Date | Pages | Decision | Proc Date |
|------------|-----------|-----|------|-----|--------|---|------------|-------|----------------------|-----------|
| AD0343932 | 78-03117A | 213 | 1 | 18 | 5117 | Scientific Information Report Chinese Science (34) | 10/22/1963 | 89 | Approved For Release | 3/29/2004 |
| AD0344702 | 78-03117A | 214 | 1 | 21 | 5149 | Scientific Information Report Chinese Science (35) | 11/4/1963 | 133 | Approved For Release | 3/29/2004 |
| AD0344965 | 78-03117A | 215 | 1 | 4 | 5163 | Scientific Information Report Chinese Science (36) | 11/7/1963 | 133 | Approved For Release | 3/29/2004 |
| AD0345229 | 78-03117A | 215 | 1 | 23 | 5182 | Scientific Information Report Chinese Science (37) | 11/18/1963 | 179 | Approved For Release | 3/29/2004 |
| AD0345750 | 78-03117A | 216 | 1 | 20 | 5209 | Scientific Information Report Chinese Science (38) | 12/11/1963 | 174 | Approved For Release | 3/29/2004 |
| AD0344419 | 78-03117A | 217 | 1 | 20 | 5241 | Scientific Information Report Chinese Science (39) | 12/27/1963 | 75 | Approved For Release | 3/29/2004 |
| AD0346493 | 78-03117A | 218 | 1 | 21 | 5277 | Scientific Information Report Chinese Science (40) | 1/10/1964 | 115 | Approved For Release | 3/29/2004 |
| AD0346725 | 78-03117A | 219 | 1 | 27 | 5320 | Scientific Information Report Chinese Science (41) | 1/27/1964 | 78 | Approved For Release | 3/29/2004 |
| AD0347051 | 78-03117A | 220 | 1 | 25 | 5359 | Scientific Information Report Chinese Science (42) | 2/6/1964 | 78 | Approved For Release | 3/29/2004 |
| AD0347849 | 78-03117A | 221 | 1 | 39 | 5407 | Scientific Information Report Chinese Science (43) | 3/2/1964 | 174 | Approved For Release | 3/29/2004 |
| AD0347929 | 78-03117A | 222 | 1 | 25 | 5438 | Scientific Information Report Chinese Science (44) | 3/5/1964 | 104 | Approved For Release | 3/29/2004 |
| AD0348352 | 78-03117A | 223 | 1 | 20 | 5479 | Scientific Information Report Chinese Science (45) | 3/20/1964 | 117 | Approved For Release | 3/29/2004 |
| AD0349491 | 78-03117A | 225 | 1 | 18 | 5560 | Scientific Information Report Chinese Science (46) | 4/24/1964 | 118 | Approved For Release | 3/29/2004 |
| AD0349657 | 78-03117A | 225 | 1 | 34 | 5581 | Scientific Information Report Chinese Science (47) | 5/4/1964 | 98 | Approved For Release | 3/29/2004 |
| AD0332751 | 78-03117A | 183 | 1 | 29 | 3940 | Scientific Information Report Electronics And Engineering (22) | 10/19/1962 | 68 | Approved For Release | 3/29/2004 |
| AD0333146 | 78-03117A | 186 | 1 | 20 | 4041 | Scientific Information Report Electronics And Engineering (23) | 11/23/1962 | 73 | Approved For Release | 3/29/2004 |
| AD0334103 | 78-03117A | 188 | 1 | 37 | 4136 | Scientific Information Report Electronics And Engineering (24) | 12/20/1962 | 62 | Approved For Release | 3/29/2004 |
| AD0334236 | 78-03117A | 190 | 1 | 40 | 4217 | Scientific Information Report Electronics And Engineering (25) | 1/22/1963 | 48 | Approved For Release | 3/29/2004 |
| AD0334769 | 78-03117A | 193 | 1 | 39 | 4339 | Scientific Information Report Electronics And Engineering (26) | 2/28/1963 | 68 | Approved For Release | 3/29/2004 |
| AD0335480 | 78-03117A | 196 | 1 | 17 | 4436 | Scientific Information Report Electronics And Engineering (27) | 3/21/1963 | 95 | Approved For Release | 3/29/2004 |
| AD0336306 | 78-03117A | 199 | 1 | 2 | 4538 | Scientific Information Report Electronics And Engineering (28) | 4/25/1963 | 69 | Approved For Release | 3/29/2004 |
| AD0332433 | 78-03117A | 183 | 1 | 35 | 3946 | Scientific Information Report Organization And Administration Of Soviet Science (5) | 10/22/1962 | 60 | Approved For Release | 3/29/2004 |